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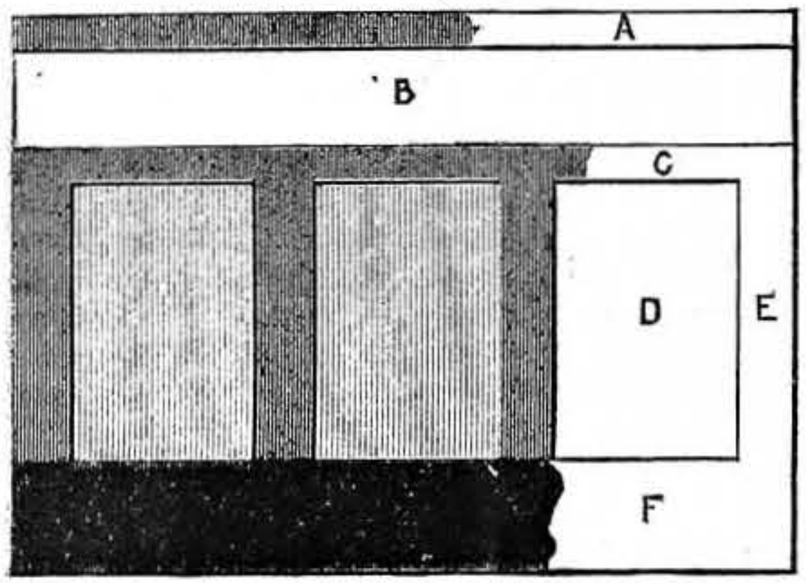
Fig. 1.



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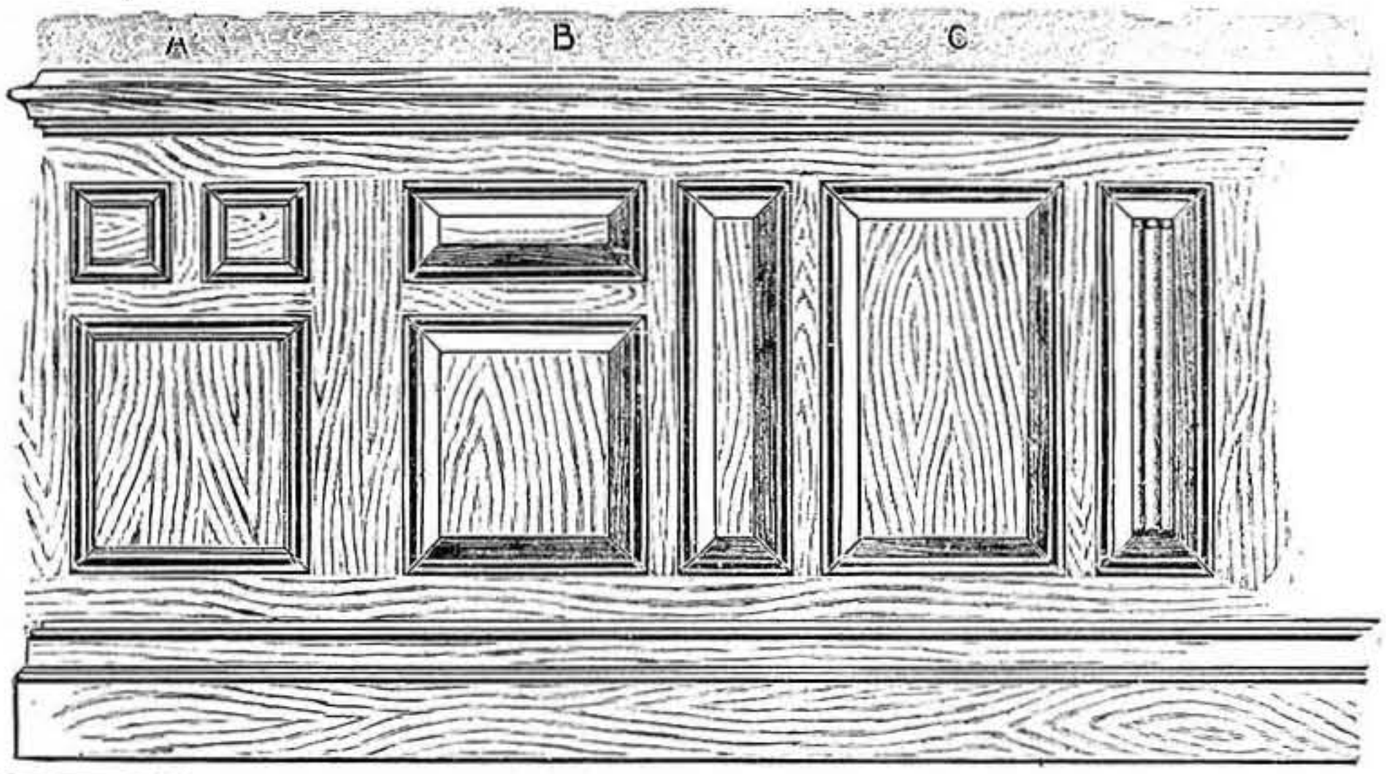

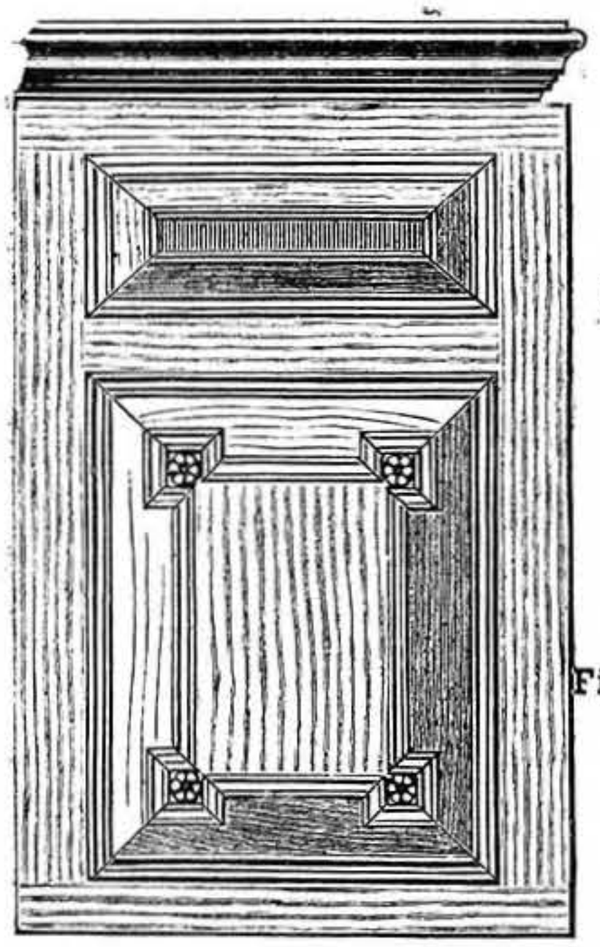

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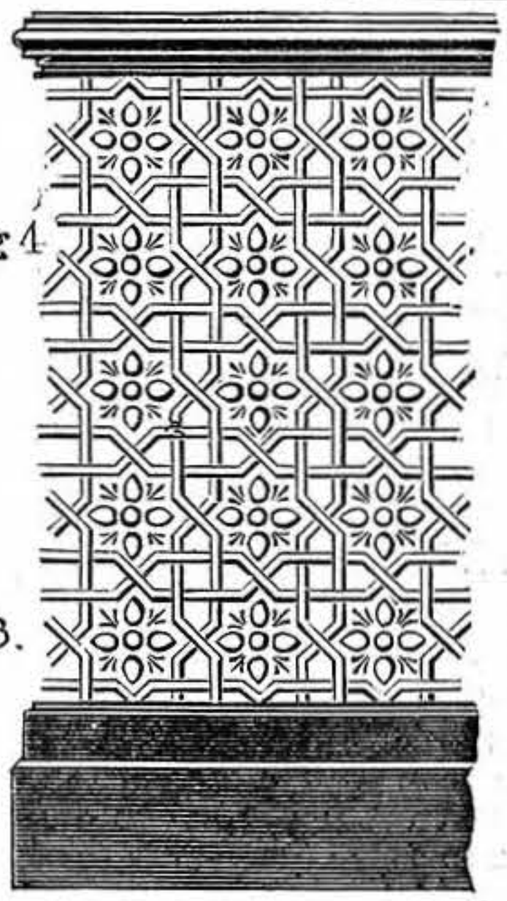
Fig 4



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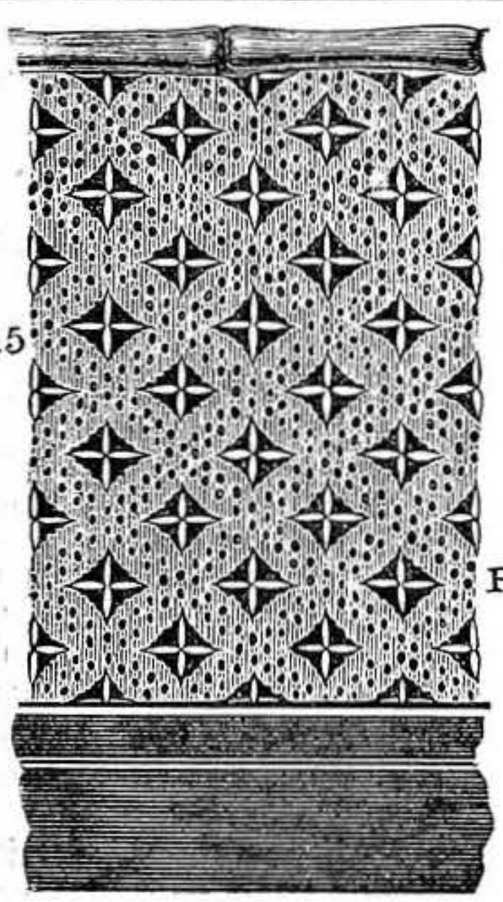


Fig 6

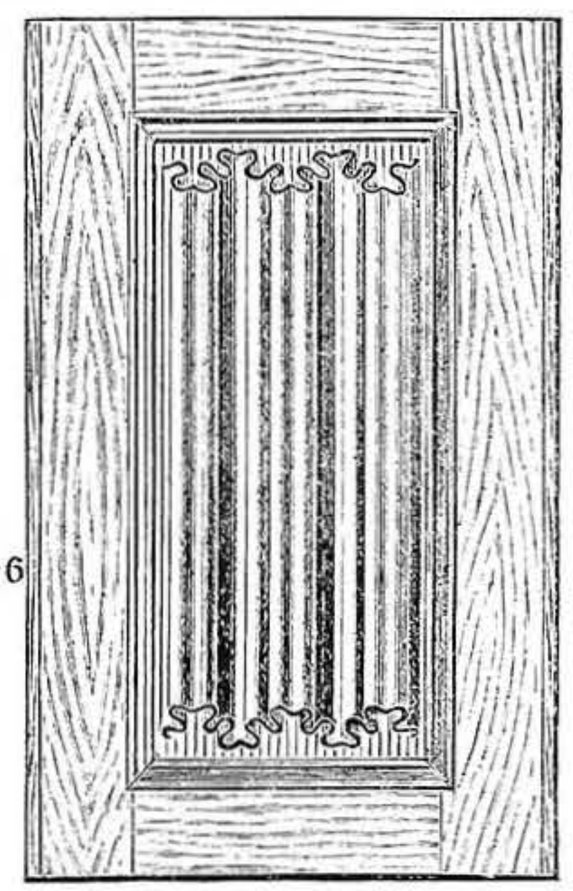


Fig. 7.

Fig. 8

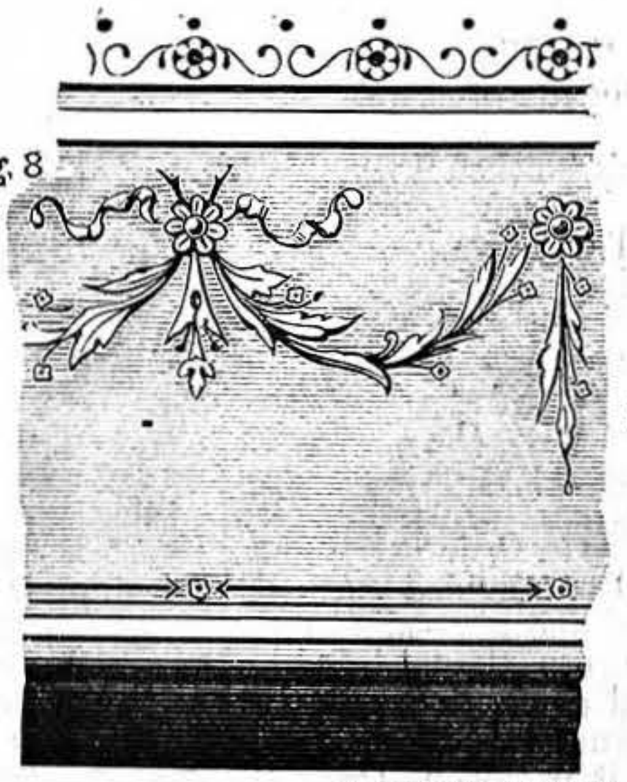


Fig. 9

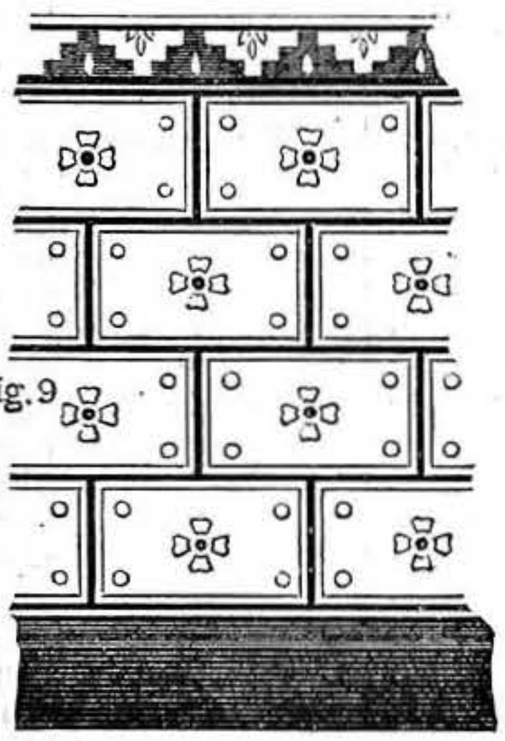
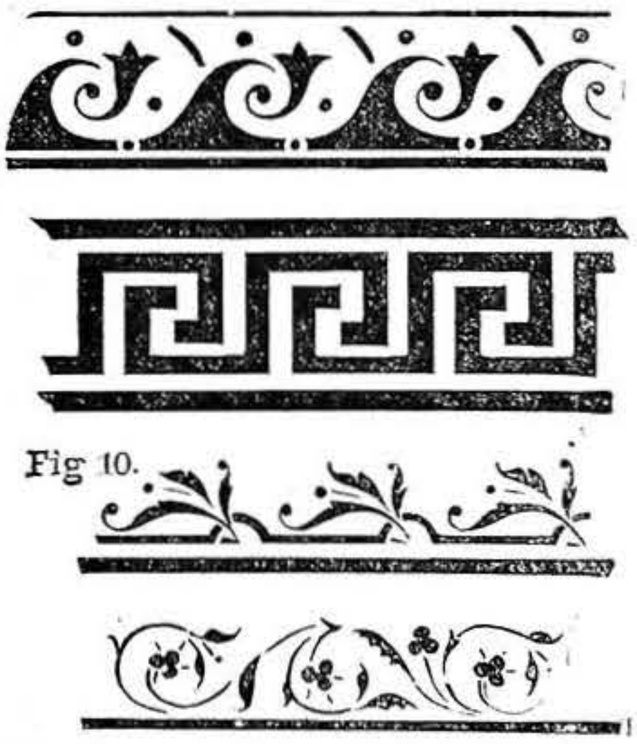


Fig 10.



A DISSERTATION ON WALL DADOES.

Fig. 1.—Diagram of Side of Pompeian House, after Owen Jones. Fig. 2.—Wood Dadoes: three Simple Panel Treatments, A, B, C. Fig. 3.—Anaglypta Dado. Fig. 4.—Ditto, Diaper Design. Fig. 5.—India Matting with Bamboo Dado Rail. Fig. 6.—Lincrusta: Imitation Carved Wood. Fig. 7.—Alabastine: Dado and Border, Simple Treatment. Fig. 8.—For Hand Painting. Fig. 9.—Gothic Dado and Border. Fig. 10.—Dado Borders for Stencilling over Plain Painted Dadoes. (Scale, ½ in. to 1 ft.)

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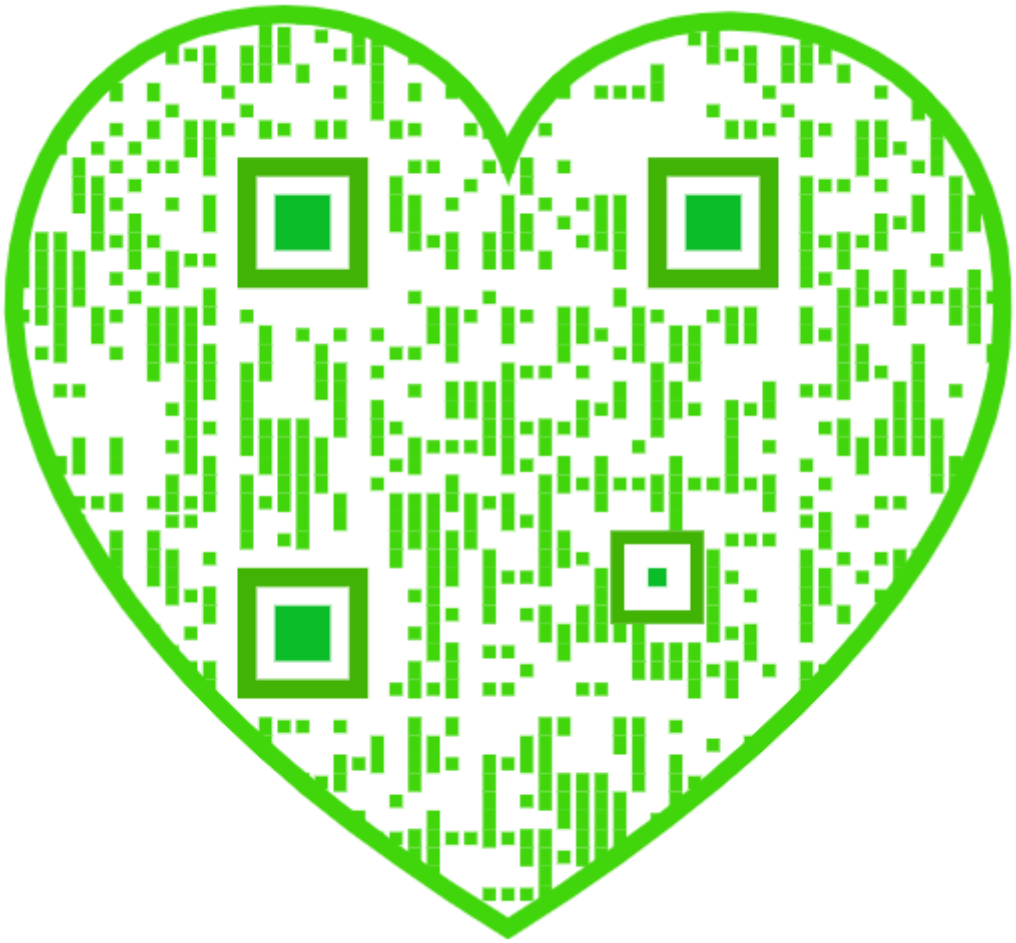

A DISSERTATION ON WALL DADOES.

BY FREDERICK PARSONS, F.S.Sc.

EXPLANATORY — RETROSPECTIVE — THE ANCIENT POMPEIAN DADO — RENAISSANCE — ELIZABETHAN — HANOVERIAN — MODERN DADOES: THEIR UTILITY — DECORATIVE VALUE — EXAMPLES OF MODERN DADOES IN VARIOUS STYLES AND MATERIALS.

IN some preceding numbers of WORK it has been my privilege to call its readers' attention to the subject of modern wall coverings, and in connection therewith to the province and value of colour. Therein we concerned ourselves with, respectively, the nature and qualities of materials, and the value of colour as a visual means of expressing and conveying sentiment. With a further view to making these fragmentary efforts a means of practical advice and assistance in their entirety, I purpose again to revert to the subject of materials, and therewith to deal, in a necessarily condensed form, with the general practice of dividing and sub-dividing wall surfaces into the divisions known as dado, filling, and frieze.

The dado, as a *common feature* of apartment and staircase walls, is an item of very modern and rapid growth. Ten years ago the technically "strongly flavoured dish" which my head-line suggests would scarcely have been considered interesting matter to such a heterogeneous mass as the intelligent readers of WORK. At that time "Lincrusta-Walton" was in its infancy; Japanese leather papers were the latest novelty amongst the high-price and West-End decorating firms; whilst "Anaglypta," "Alabastine," and many other strong claimants for attention to-day had then no commercial existence. If we are desirous to know what factor has caused the dado to become a "common hack," we have only to consult the enterprising paper-stainer's book of next spring's goods, and find therein dadoes, borders, and fillings, "made to match," at a retailing price of less than 6d. per roll of twelve yards. Well, I suppose none of us need feel personally aggrieved at this "levelling down" of an ancient and honourably connected feature. No one is materially the worse if Mrs. McCarthy, with natural envy of Widow Malony's "illigant dado," hies herself forthwith to the local glass, putty, and paper shop, and makes a like purchase. Not in the least. But very few of us can forbear making mental comparisons between "mind and matter," when, as is often the case, we find these cheap and usually pleasant wall coverings a direct antithesis to the crumbling structure, filthy and unwholesome surface, that lies beneath their bright exterior. "As we sow, so must we reap;" and therefore, if by reason of unrestrained judgment the paper-stainer makes worse than common the association of his "wall papers, with dadoes to match," the discredit, as well as commercial ill-effects, must be borne by them also.

Retrospective.—In order to remove from the mind such prejudice as the above-mentioned circumstance may raise, and to gather some idea of the respect that is due to our subject, we must turn back the pages of time, not merely ten or a hundred years, but to the dim past ages of the great Roman Empire—to the period when those beautiful cities, Pompeii, Stabiæ, and Herculaneum were so tragically buried beneath the streams of molten lava and showers of cinders vomited forth on the 24th of August, A.D. 79, by that monster of destruction Mount Vesuvius.

Although it is probable that were we to explore minutely the still more ancient remains and records of Egyptian, Chinese, and Grecian decoration, we might come across earlier examples of dadoes—sur-base divisions—on wall surfaces; nevertheless, it was not until the ancient Roman artists—and particularly those of Pompeii—worked out their elaborate and fanciful schemes of painted wall decoration that the dado became as definite an interior division as the pilaster and frieze.

The Pompeian treatment, as will be seen on reference to the diagram Fig. 1, did not consist only of a horizontal line, which merely divides the wall flank into two (upper and lower) divisions—now termed by us *filling* and *dado* respectively—but the latter was really the superficial and decorative sur-base of one complete effect. We may not stop here to analyse the proportion of dado to panel (or filling), of panel to pilaster, and so forth. It is, however, advisable to point out that considerations of utility had little or no place in the arrangement of the sub-divisions or their subsequent embellishment. Like as in the Japanese and the Italian Renaissance styles of design and decoration, the Pompeian artists studied to produce effects pleasant simply to the senses—the æsthetic province of decoration. Those amongst my readers who apparently, like the contributor of a certain tirade against purely ornamental beauty of design, have not yet learned to appreciate anything but *phonetic—mind-speaking*—ornament, should not fail to spend an entire day in that beautiful reproduction of a Pompeian house at the Crystal Palace.

Fifteen hundred years after these classic Roman ages, Italy was stirred throughout by a re-awakening—Renaissance—of art and architecture. Then were the sites of ancient cities and the remains of classic art fully explored, and the artistic work of those middle ages was consequently much influenced by the discoveries and studies relating thereto. It is not to be wondered at, therefore, that we find elaborate division and painting of wall surfaces a special feature of also the Italian Renaissance decorations.

The Elizabethan style of ornamentation was to a great extent an offshoot of the Renaissance, and in this period dadoes and high-panelled wall divisions were much in vogue. Although it might be suggested that a wooden dado notion is such as might have come naturally to the mind of the native Elizabethan architect—at a period when the English oak and a good stone wall were the chief building considerations—it is more probable, one would think, that the custom was brought over from the Lowlands—a sign as definite as the Elizabethan ornament itself of the influence of the *Flemish* phase of the great Renaissance.

The Hanoverian period, although anything but remarkable for its contemporaneous works of architectural or decorative excellence, brings to our minds the influence and life's work of two eminent architects—the Brothers Adams. We cannot now discuss the purely artistic merit of the interior ornamentation originated by these men of much respected memories; it is sufficient here to note that the arrangements of design alluded to are noticeable in their prominent display of panelled and sub-divided surfaces, also by a lightness and delicacy—almost to frivolousness—of the ornamental detail; and, further, in natural connection with the first characteristic, a general use of dado and frieze. From all this it is evident that the Pompeian style was a source of inspiration to the Adams Brothers in all respects—save that of the degree of conventionalism in which the detail was drawn and the substitution of ornamental *relief* form for the strong, sensuous colouring of the ancients.

With the foregoing cursory glance over the historial associations of the dado we must rest content—our work is of the present, not the bygone ages.

In dealing with the *modern dado* and its "thousand and one" variations of style, material, and treatment, one's professional experience—at all times subject to some limitations—is here the only source to be drawn upon. If the memory is taken back to the days immediately preceding the introduction of Lincrusta-Walton, now approaching twenty years, the influence of the Adams' style was still very marked. In the West-End districts of the metropolis, and encased within the ugliest of square brick-built houses, beautiful designs of the above type were repeatedly met with, and, in fact, many are still preserved. With these examples continuously before him, the modern professional decorator quickly availed himself of the dado division as a means of contrast and decorative display for the new materials—which productions, by reason of their expense or great richness and elaboration, it was not expedient to hang all over the walls. Having now defined the source of the modern dado's popularity—fashion, alas! being almost as rampant in house decoration as with ladies' clothing—it is superfluous to trace it through the various stages of rarity and generality down to the before-mentioned depths of trashy degradation and misuse. There is still one minor feature in connection with dadoes yet unmentioned. For many years past it has been an occasional plan with builders to divide a parlour wall by a "chair-rail." The fixing of these bands of more or less moulded wood-work—usually of anything but an elegant nature—for the purpose of preventing the tops of the chair-backs from knocking the plaster wall, although, no doubt, adopted as a "clever notion," is not a very commendable practice. A chair-rail proper is a piece of moulding fixed at the *base of the skirting*, where it answers the purpose equally well in keeping the chairs from the wall. Again, the height of a chair-back is scarcely a guide for the proportion of dado to filling—anything but that—whilst the notion of getting first the chairs, then the wall to suit the chairs, suggests some very absurd combinations. It is, therefore, scarcely fair, I think, to the modern dado to associate its origin with the old chair-rail.

The utility of the modern dado is a subject presenting a twofold aspect: viz., first in connection with "wear and tear," and secondly, that relating to its usefulness as a purely *decorative* feature. There is, however, at least *one* leading principle common to the introduction of both, and this—*that the more the lower portion of a room wall is likely to be hidden by furniture the less suited is the apartment for a dado.* Simple and common-sense enough as this principle is, one seldom finds it carried out in practice. We may often see in a modern house the dining-room dado panelled all around alike, so that when the occupier's sideboard and buffet is *in situ* many yards of expensive panelling is hidden. Had the architect used a commensurate amount of time and material for making an inexpensive fixed sideboard in character with the dado, both the artistic and commercial issues would have profited. Again, in the modern drawing-room, dadoes have been "pushed" alarmingly by the paper-stainer, whereas the expense is literally thrown away; half, or

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more, of the dado is unseen, and even that latter portion, instead of serving as a foil and background to the best furniture and accessories, more often detracts from the shape and outline of such goods. It is thus patent to us that the usefulness of the dado division not only varies with different apartments and the uses to which they are put, but is further intimately concerned with the style and arrangement of the furnishing. In connection with the homes of the "masses," a dado division will prove very economical for staircase, passage, and kitchen. Nothing can compare with a light and cheap filling division of distemper, both for effect and cleanliness; and when the surbase is painted either a darker tone of the same colour or a dark contrasting colour, wear and tear is well provided for. The practice of pasting paper over paper until it forms one mass of putrefying vegetable nastiness has probably caused ten times more sickness than ever the presence of arsenic in wall papers has been responsible for. Cheap papers are more related to the percentage of interest on house property investments than to any other artistic or useful consideration. If every dwelling-house had the same attention from Government inspectors as is given to the workshop and factory, many would benefit therefrom. We should certainly have better finished walls, lighter and more cheerful interiors, and far purer air to breathe, if the cheapest wall paper cost 2s. 6d. per roll, for it would then be recognised, of necessity, that plain tints of distemper formed the best cheap covering.

The decorative value of the dado, although a subject of less practical interest to my readers, calls for a few sentences. In the first place, the base division of a wall breaks up the monotony of the surface mass. The dado, however, has no material connection or association with the *build* of the wall. Even with costly wooden dadoes these are always attached as accessories, surface treatments, and as such must be considered part of the furnishing. One of the effects of a dado is to convey a snug, "closed-in" sentiment, and which, when carried to extremes of proportionate height, gives the impression of "sitting in a well." Therefore, by reason of the horizontal *tendency of line*, the feeling of *sur-base support*, and the *scope for contrasting colour*, the dado as a purely decorative factor is invaluable in the embellishment of our homes. In design they should never be "patch-worky," *repose* being a desideratum. Where there is full scope for display a dado of rich-looking relief material is very effective, care being taken that the form of the furniture is always helped by the contrast of pattern as well as tone. Imagine a shaped wooden chair-back placed against a dado space covered with a stiff design of something between a Chinese puzzle and a Gothic ceiling pattern, and you will understand "what not to do," my reader. With regard to *colours* combined with pattern, the fewer the better in a dado. Next to one general colour, the most suitable treatments are soft monochrome effects, whilst all strong subdivisions of line or assertive contrast in colour, and—unless in the nature of a highly raised leather paper—all gilding and metallic colours should be avoided for the dado of an *ordinary apartment*.

The examples of modern dado materials which are given on page 753 should serve to emphasise some of the various points I have herein drawn attention to. Their height, it will be observed, varies considerably, but in dealing with the average room the height of the top of the door lock-rail gives a useful proportion of filling and dado. The latter should never, unless with high wooden panelling, come above the mantelpiece, and the aim should always be to work in the line of rail, or top border, with some pre-existing structural feature of the room. Beyond mere consideration of colour and oil paint, the materials adaptable to dado purposes are innumerable. American oil-cloth, India matting, cretonnes, Turkey twills, brown paper (bought in continuous rolls and finished with painted decoration), plain "oil-grounded" papers, and the great variety of ordinary wall papers, Lincrusta-Walton, Willesden paper, Tectorium, leather papers, Alabastine, Anaglypta, and many more could be added to the list. Our worthy Editor will surely say, "Hold! enough!"

THE WINTER ELECTRICAL MACHINE AND ACCESSORY APPARATUS.

BY CHAS. A. PARKER.

THE GOLD LEAF ELECTROSCOPE—PROOF PLANE—PITH BALL ELECTROSCOPE — HORIZONTAL ELECTROSCOPE — PITH BALLS — HENLEY'S QUADRANT ELECTROMETER—SPANGLED TUBE—LUMINOUS NAME-PLATE—ELECTRICAL SWING—ELECTRICAL SEE-SAW—ELECTRICAL MORTAR—HENLEY'S UNIVERSAL DISCHARGER—EXPERIMENTS WITH THE DISCHARGER—CONCLUSION.

THE *Gold Leaf Electroscope*, which is depicted in Fig. 56, will be found a most useful piece of apparatus to possess when studying the phenomena of induction, or for the purpose of detecting minute charges of electricity. It consists of a couple of narrow strips of gold leaf attached to a flattened piece of brass rod, to the upper end of which a flat disc of metal is affixed, the leaves thus prepared being enclosed in a glass jar mounted on a wooden stand. For the glass jar an ordinary chemical deflagrating jar will be found to answer very well; or, failing this, a "comet" pattern domestic lamp chimney may be made to serve the purpose fairly well. It will be necessary to employ the largest size of this pattern chimney, which will measure 6½ in. high and 2½ in. diameter; any oilman or ironmonger can supply these at about 3d. each.

When a suitable glass jar has been procured, the next proceeding will be to provide it with an ornamental turned wooden base, which should be furnished with a slight groove, into which the glass may fit. In the absence of anything better, the base may be made in a simple manner from a cigar-box lid by cutting out a couple of discs, one of which is made to just fit into the jar, with the other one about ¾ in. larger. These two discs may now be glued and clamped together firmly, and when dry, a disc of foil of suitable size is pasted on to the upper surface of the smaller disc. A couple of narrow strips of tinfoil—about ½ in. wide, and nearly half the height of the jar—should now be pasted inside the glass jar on opposite sides, in order to serve as a means of discharging the gold leaves if they should become overcharged at any time.

We shall now require a 5 in. length of stout brass wire, one end of which should be softened in a gas flame, and then bent to the form shown in Fig. 57, the lower portion being hammered quite flat, in order to afford an attachment for the gold leaves. A small disc of brass must now be soft-soldered to the bent portion of this wire in the manner indicated by the dotted lines in Fig. 58, and when this has been done it will be necessary to insulate the wire, and then fit it into the cap of the jar. The wire is heated in the centre, and then provided with a thick cylindrical coating of shellac, which should be made to flow evenly round the wire for about a couple of inches along its length, being rolled whilst hot between the fingers until of a uniform diameter, about the thickness of an ordinary cedar pencil. Thus prepared, the whole is inserted in a hole previously bored in good sound cork of a suitable size to fit into the opening at the top of the jar. If desired, a small turned wooden cap may be glued on to the cork, in order to form a better finish.

The wire will now be ready to receive the gold leaves, which, by the way, should be the real article, and not Dutch metal, as the latter is much too harsh for our purpose. A leaf of gold should be gently coaxed from its containing book on to a sheet of clean note-paper, which is then folded and cut into strips about 2 in. long and ½ in. wide, using a pair of sharp scissors for the purpose. Both sides of the flattened end of the brass rod should be moistened with just a trace of glue or gum, after which the two strips of gold leaf are attached to the rod with the greatest possible care. It will be necessary to hold the breath while the leaves are being manipulated, otherwise they may become crumpled and blow away. When ready, the wire should be quietly and gently introduced into the jar, with the leaves hanging perfectly parallel to the foil strips attached to the sides of the jar. It is necessary that the leaves should be just clear of the glass on either side when they are greatly diverged.

The glass should now be cemented on to the wooden base, after which the air should be sucked out of the interior by means of a glass tube inserted in a hole bored for the purpose through the cork, the aperture being closed with a dab of sealing-wax immediately afterwards. It will add considerably to the appearance of the instrument if the under-side of the disc and the top of the cork or cap is painted over with a coat of red sealing-wax varnish.

A *Proof Plane* (which is shown in Fig. 59) will be found very useful to employ when charging the electroscopes. It can be readily made by simply cementing a brass knob or thin disc of sheet brass with perfectly smooth edges into a suitable length of glass tube of small size and bore, as shown in the illustration.

The *Pith Ball Electroscope* (see Fig. 60) is another form of electroscope, which may be readily made in the following manner: One end of an 8 in. length of soft glass tubing, ¼ in. in diameter, is first drawn out to a fine point in a Bunsen flame, and is then bent in the form of a curve, with a small hook at the end, as shown in Fig. 60. Thus prepared, the larger end is cemented into a hole bored for its reception through the centre of a small ornamental turned wooden base, which is afterwards painted with enamel spirit varnish. This done, the pith ball is suspended from the hook of the supporting stem by means of a single filament of "cocoon" silk, which is drawn through the ball by means of a needle, and then knotted at the end.

The *Horizontal Electroscope* depicted in Fig. 61 is another description of electroscope, which takes the form of a straw balanced on a needle-point mounted on a short length of glass tubing, and attached to an ornamental turned wooden base. First prepare a small turned wooden base about 2½ in. in diameter, and then provide this with a hole in the centre, into which a 2 in.

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length of soft glass tube is cemented. Previous to the tube being cemented into the base, draw out one end to a fine point by means of a Bunsen flame, and then, holding a small sewing-needle point outwards in a pair of pliers, proceed to fuse the thick end of this into the drawn-out end of the glass tube, being particular to see that it is quite true with the tube.

The glass stem having been cemented into the wooden base, the latter should receive a coat of spirit enamel, after which it will be ready for the straw. For this we shall need a perfectly straight 9 in. length of sound wheat straw, which will require to be mounted on a small metal pivot to act as an axis. To make this pivot, take a piece of stout brass wire, and having first filed one end to the form of a cone, cut off a $\frac{3}{16}$ in. length, and then drill a small hole longitudinally towards the apex of the cone, afterwards cementing the pivot thus formed into a hole burnt through the middle of the straw by means of a hot wire, after which a small pith ball is glued to either end of the straw. This hole in the pivot will naturally require to be drilled perfectly true, in order that the straw may balance correct, and be capable of twisting round at the slightest influence.

The *Pith Balls* above mentioned can be readily cut to the spherical form from a piece of perfectly dry elder pith, using a very keen razor for the purpose. When cut, the balls may be gently rolled beneath a flat board, in order to remove any little irregularities of surface, care being taken not to crush them. Bundles of pith, suitable for this purpose, can always be obtained from any watchmaker's tool warehouse at 2d. each.

Henley's Quadrant Electrometer (shown in Fig. 62) will be found a very useful instrument for ascertaining the tension or amount of electricity collected on the prime conductor. It takes the form of a graduated semi-circle of ivory or celluloid attached to a vertical rod, which can be readily mounted on the prime conductor of the machine. From the centre of the graduated disc a light pith ball is hung on a pivot, and as the latter flies up the scale as the machine is worked, it is considered to indicate the amount of electricity developed. The graduated scale may be prepared from a thin piece of mahogany, cedar, celluloid, or vulcanite, which is carefully cut to the semi-circular plan shown at A in Fig. 63, with a slight projection at either end, in order to provide for its subsequent attachment to the supporting stem.

The component parts of the electrometer are shown full size in Fig. 63, but if desired, it can be made larger or smaller, provided that the dimensions are kept proportionate.

Having got the scale roughed out, take a pair of compasses and strike out three semi-circles, about $\frac{1}{8}$ in., $\frac{1}{11}$ in., and $\frac{1}{16}$ in. distant from each other, after which all the divisions should be carefully marked in black, red, or Chinese white, according to taste. A small piece of thin sheet brass is now cut to the plan of B, Fig. 63, and afterwards bent into the form of a tubular hinge, in which one opening crosses the top of the other, as will be seen by reference to C, Fig. 63. This hinge is now pivoted in the axis of the scale by means of a short brass pin or stud riveted into a hole prepared for its reception in the scale, care being taken to see that the hinge moves with perfect freedom.

The scale is now fitted tightly into a slot of sufficient length and width, which is filed half-way through a $4\frac{1}{2}$ in. length of brass tube of small diameter (D, Fig. 63), after which a small brass ball (E, Fig. 63), provided with a hole of sufficient diameter, is made to fit over the upper end of the tube, thus securing the scale in position, an ordinary brass screw (F, Fig. 63) being finally soft-soldered to the lower end of the tube, in order to afford a means of attaching the electrometer to the prime conductor of the machine. A very thin round match (G, Fig. 63) or a sound straw is now cemented into the opening in the central hinge with a small pith ball (H, Fig. 63) affixed in a like manner to the lower end of the match. It will also be found convenient to have a small turned wooden base on which to support the electrometer when not in use.

The *Spangled Tube*, or luminous hand spiral, illustrated in Fig. 64, is a very interesting piece of apparatus for showing the effects of the discharge when passed through a series of small bodies nearly in contact. Take an 18 in. length of $\frac{1}{2}$ in. or $\frac{3}{4}$ in. soft glass tubing, and having carefully cleaned the inside by means of a piece of rag tied to the end of a string and drawn through the tube, warm the air contained within the tube in order to dry it, and then tightly fit a good sound cork into the opening at either end, afterwards cutting the ends off flush with the edges of the tube.

Now take a sheet of tinfoil, and having laid it on a metal surface (preferably zinc) cut off a few strips $\frac{1}{8}$ in. wide by the aid of a keen-edged penknife and a ruler, being careful to cut the foil perfectly clean and free from ragged edges. Thus prepared, the strips of foil are stuck round the glass tube in a spiral form by means of shoemaker's paste, care being taken to lay them on the glass perfectly true and free from creases, after which any superfluous paste is wiped off with a damp cloth, and the tube placed aside until quite dry. When thoroughly dry, the foil must be cut up into a series of hexagonal pieces by means of the penknife drawn across the strips in the manner shown in Fig. 65, in order to remove all the shaded portion shown in the above illustration.

As the glass rapidly blunts the knife, it will be necessary to frequently sharpen it on a hone. At this stage of the proceedings one end of the tube will require to be provided with a brass ball of suitable size: an ordinary ottoman ball will be found to answer the purpose admirably, as the screw stems with which these balls are provided will enable it to be screwed into the cork of the tube, care being taken to see that it is in metallic contact with the foil. The other end of the tube should have an $\frac{1}{2}$ in. strip of foil pasted round the glass, with about $\frac{1}{8}$ in. turned over on to the cork, and a small disc of foil pasted over the flat end. It will also be found convenient to have an ornamental turned wooden base on which to support the tube in a vertical position.

The *Luminous Name-Plate*, depicted in Fig. 66, is a slight modification of the spangled tube, by means of which it is possible to show illuminated names or devices, which have a very pretty effect when viewed in a darkened room. The design or word is formed by pasting a number of small hexagonal pieces of foil on to a sheet of glass of suitable size, with horizontal strips of foil pasted in lines across the glass, in the manner shown in Figs. 66 and 67. Thus prepared, the glass is mounted in a wooden frame, which is supported on a glass stem attached to an ornamental turned wooden base. A small brass knob is now affixed to one of the upper corners of the frame in contact with the top horizontal lines of foil, and a small hook is attached to the opposite lower corner in a similar manner. In use, the discharge is passed in the usual manner from the upper knob along the horizontal lines of foil, and out by means of a piece of chain suspended from the hook at the lower end of the frame.

The *Electrical Swing* and *See-saw*, shown in Figs. 68 and 69, are a couple of amusing pieces of apparatus for showing the phenomena of attraction and repulsion. Taking the swing first, a piece of sound dry mahogany, measuring 6 in. by 4 in., is carefully planed up on the face and edges, and then provided with four supporting feet in the usual manner. This done, a couple of 7 in. lengths of glass rod, $\frac{1}{2}$ in. in diameter, are cemented into a pair of turned wooden sockets furnished with short projecting pins, in order to provide for their subsequent attachment to the base. Two small hollow brass ottoman or stool balls, of a suitable size to fit over the tops of the glass rods, are then provided with small brass hooks, which are soft-soldered into holes drilled for their reception in the side of each ball, after which the latter are cemented on to the upper ends of the glass supports.

The projecting pins of the wooden sockets of the glass rod are now glued into a couple of holes prepared for their reception on opposite sides of the base, with the hooks of the brass caps facing each other on the inside. A small brass ball is next soldered to one end of a 2 in. length of stout brass rod, the other end of which is then pointed by means of a file, and afterwards pushed firmly into the wood-work at one end of the base. When this has been done, another hollow brass ball is provided with a small brass hook in the manner before described, and is then cemented to the end of a 2 in. length of glass rod, which is afterwards glued into a hole of suitable size, bored for its reception, at the other end of the base.

A small pith figure, cut and painted to form a neat little doll, about $1\frac{1}{2}$ in. in height, is now mounted on a thin flat piece of pith, which forms the seat of the swing. This figure is afterwards slung between the two insulated pillars of the stand by means of a silk thread passed underneath the seat of the swing, and up through a couple of holes on either side, the upper ends of the silk terminating in small loops, by which it is suspended from the hooks of the insulated supports.

When in use, the swing is connected with the machine by means of a short length of chain, brought from the prime conductor, and hung from the hook of the conducting rod at the back of the base, another piece of chain being suspended from the insulated ball at the front of the base, in order to provide the necessary earth contact. If properly adjusted, the figure will steadily swing backwards and forwards during the time that the machine is worked.

The *See-saw* (which is represented in Fig. 69) is but a modification of the swing just described, and is of extremely simple construction, as will be understood by reference to the above-named cut. For the base, a piece of mahogany, 10 in. by 3 in., is carefully smoothed by means of a plane, and then provided with four supporting feet as usual. This done, a couple of 3 in. lengths of in. glass rod must be cemented into suitably turned wooden sockets, each of which should have short projecting pins turned underneath, to enable them to be glued into a couple of holes bored through the base—on opposite sides—by means of a centre-bit.

When these two supporting pillars have been attached to the stand, two short brass

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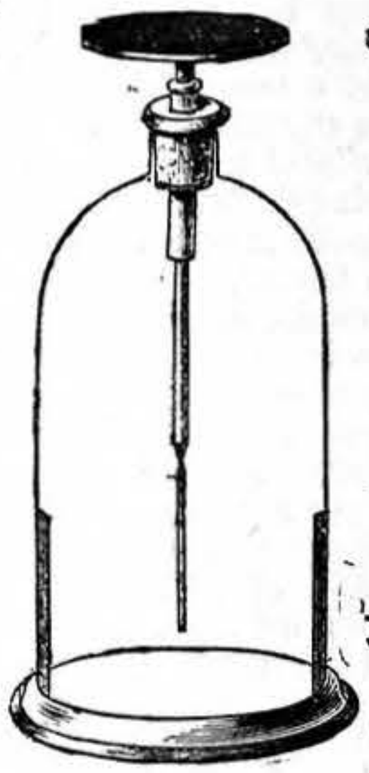


Fig. 56.

Fig. 57.

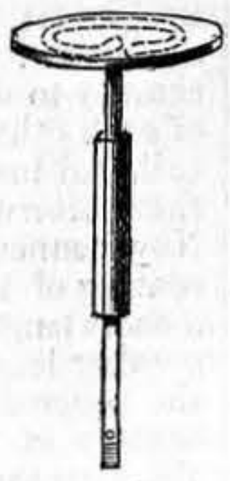


Fig. 58.

Fig. 59.

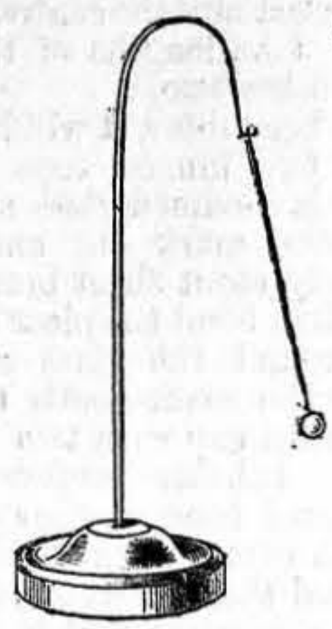


Fig. 60.

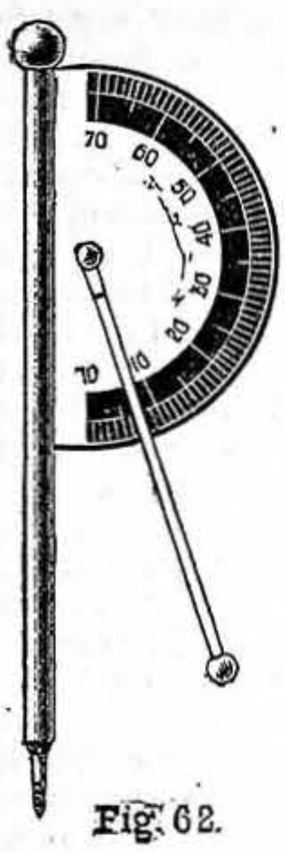


Fig. 62.

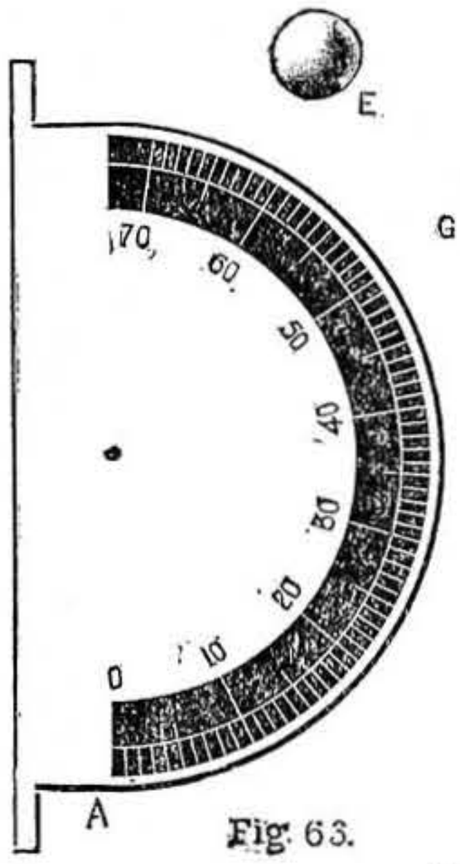


Fig. 63.

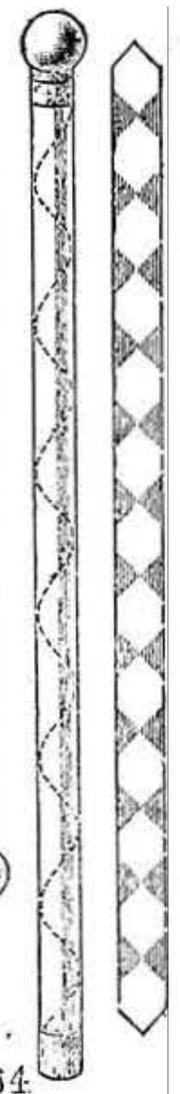


Fig. 65.

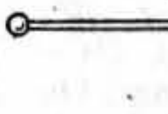


Fig. 61.

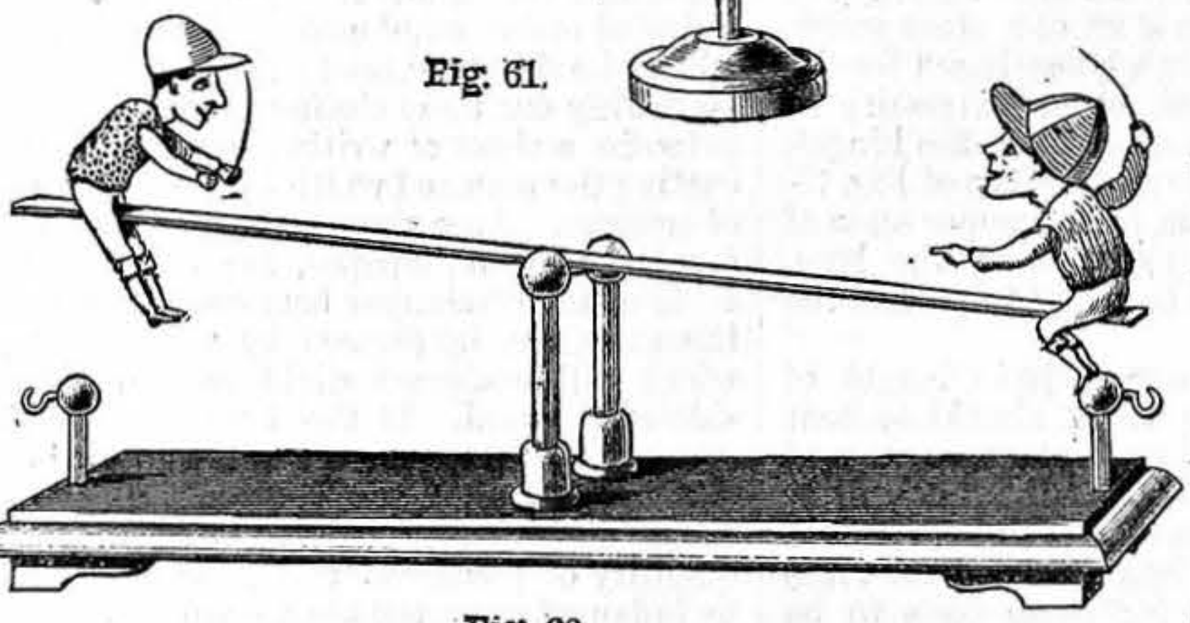


Fig. 69.

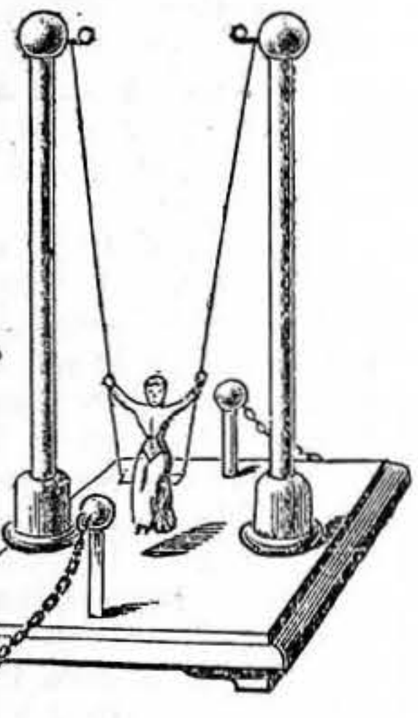


Fig. 68

Fig. 73.

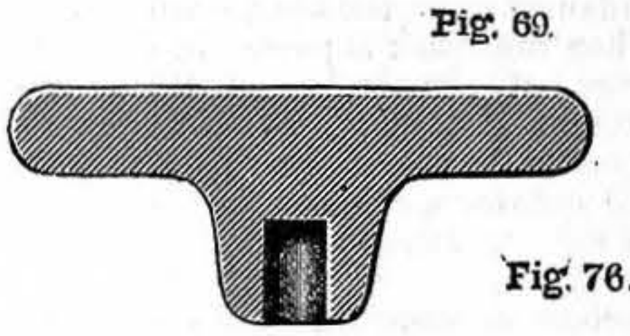


Fig. 76.

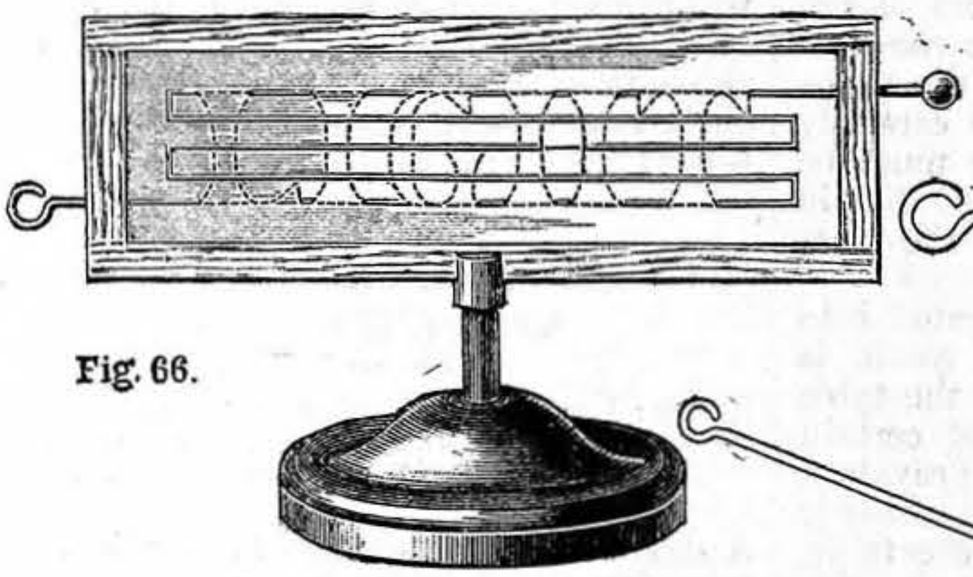
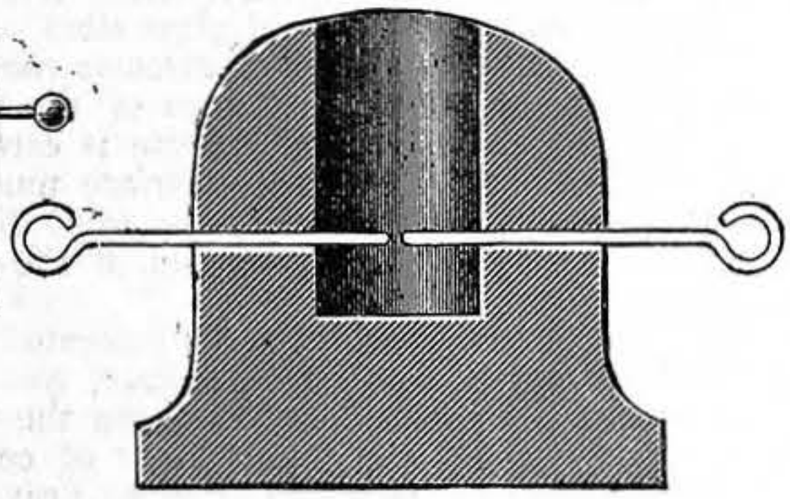


Fig. 66.



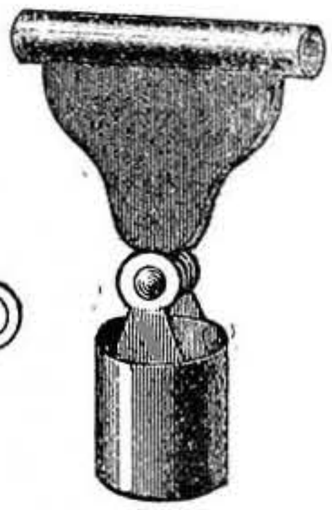


Fig. 75.

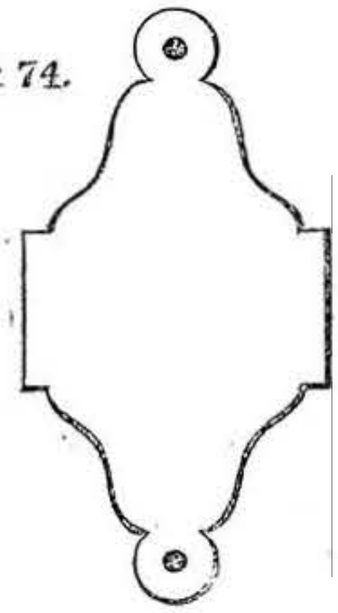


Fig. 74.

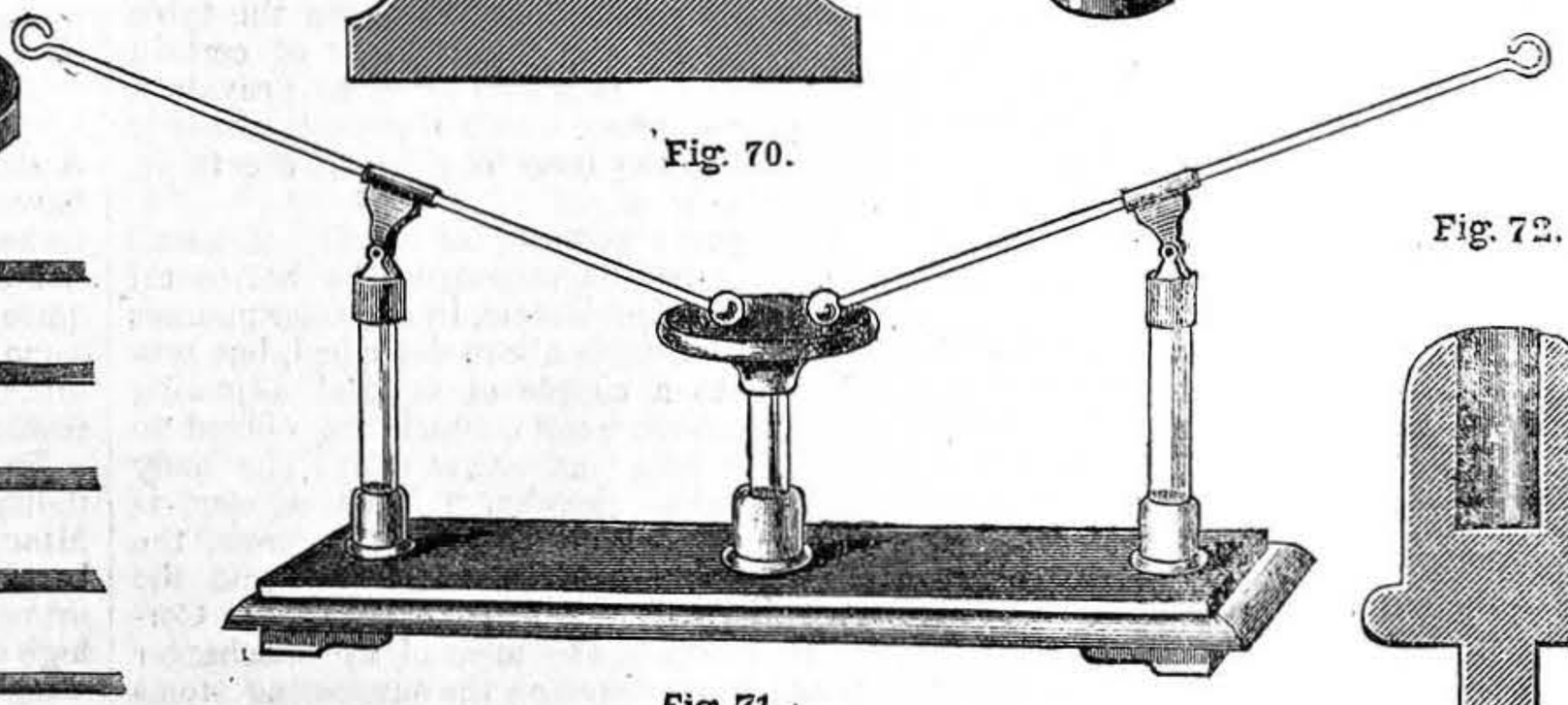


Fig. 70.

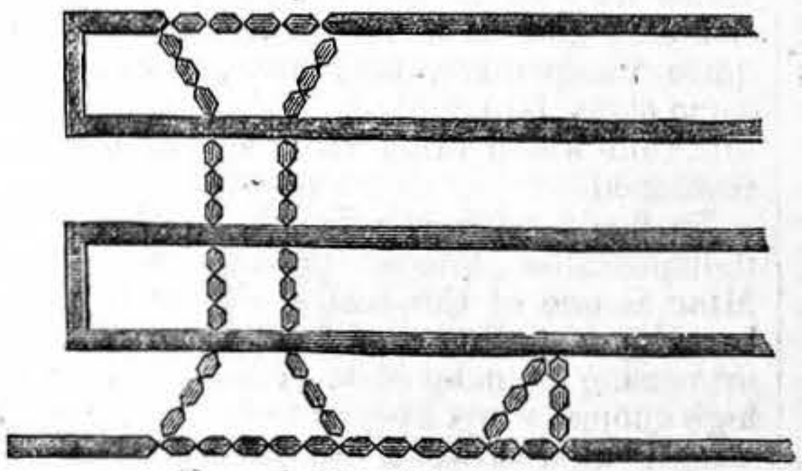


Fig. 67.

Fig. 71.

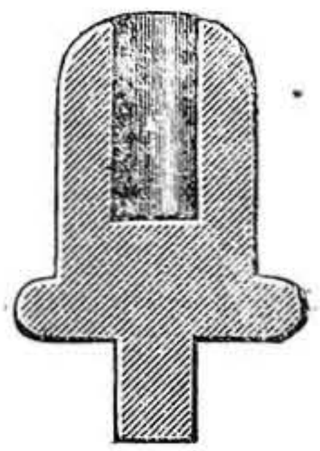


Fig. 72.

Fig. 56.—Gold Leaf Electroscope. Fig. 57.—Bent Wire Support for Leaves. Fig. 58.—Table attached to Support. Fig. 59.—Proof Plane. Fig. 60.—Pith Ball Electroscope. Fig. 61.—Horizontal Electroscope. Fig. 62.—Henley's Quadrant Electrometer. Fig. 63.—Component Parts of Electrometer—A, Graduated Scale; B, Plan of Central Hinge; C, Completed Hinge; D, Supporting Stem; E, Hollow Brass Cap; F, Screw for Stem; G, Index or Pointer; H, Pith Ball for Index. Fig. 64.—Luminous Hand Spiral. Fig. 65.—Enlarged Detail of Foil. Fig. 66.—Luminous Name-Plate. Fig. 67.—Enlarged Detail of Letter. Fig. 68.—Electrical Swing. Fig. 69.—Electrical See-saw. Fig. 70.—Electrical Mortar. Fig. 71.—Henley's Universal Discharger. Fig. 72.—Socket for Glass Pillar. Fig. 73.—Plan of Brass Cap. Fig. 74.—Plan of Brass Hinge. Fig. 75.—Cap and Hinge complete. Fig. 76.—Section of Table.

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hooks should be fitted and soldered into holes drilled through the sides of a couple of hollow brass balls, which are afterwards cemented to the ends of a pair of 1½ in. lengths of glass rod, these rods in turn being cemented into holes prepared for their reception at either end of the wooden base. A very thin lath of dry wood, 10 in. in length and about 1 in. wide, must now be pivoted between the two insulated supports by means of a darning-needle thrust through the width of the wood exactly in the centre.

A couple of hollow brass balls of suitable size, to fit the supports of the plank, should now have a small hole drilled through the side of each, after which they are cemented on to the upper ends of the supports, with the strip of wood pivoted between them by inserting the ends of the needle in the holes in the brass balls. The see-saw is finally completed by gluing a suitably carved pith figure on to either end of the balanced plank, after which it may be set in motion, in a similar manner to the swing previously described, by means of a couple of short lengths of brass chain hooked on to the conducting knobs—one of the latter being placed in communication with the prime conductor, and the other with the earth.

An *Electrical Mortar* (shown in Fig. 70) is employed for the purpose of exhibiting the deflagrating powers of the discharge. It is formed from a block of hard wood, about 2 in. square, which is turned in a lathe to the form shown in the cut, and then provided with a hole ¾ in. in diameter, which is bored from the upper side through to about half the thickness of the wood. A couple of short lengths of brass wire are now bent in the form of a small ring at one end by means of a pair of pliers, and then rounded off at the other extremity by the aid of a file. Thus prepared, they are now tightly fitted into a couple of holes bored through the block on opposite sides at ¾ in. below the mouth of the mortar, as it may now be called.

When ready, the mortar may be charged with a mixture composed of equal parts of chloride of antimony and chlorate of potash, which should be separately powdered, and then mixed together carefully by means of a feather. It is important to crush these substances separately; otherwise, if they are pounded together the mass will be inflamed. A sufficient quantity of the powder is put into the mortar to just cover the two conducting wires, one of which is now attached to the outer coating of the Leyden jar or battery, and the other to the discharging rod, by means of short lengths of brass chain, and when the discharger is brought into contact with the inner coating of the jar or battery, it will cause the charge to pass and fuse the mixture.

In *Henley's Universal Discharger* (which is represented in Fig. 71) will be found an almost indispensable piece of apparatus for use with the Leyden battery. The base should be prepared from a piece of sound dry mahogany, ¾ in. thick, carefully planed to measure 10 in. by 4 in.. and then furnished with three holes, which are bored through the wood by means of a ¾ in. centre-bit, one being situated in the middle of the board, with the others at about an inch from either end. Three small ornamental wooden sockets to receive the supporting glass rods are now turned in a lathe to the form of Fig. 72, and then fitted into the holes in the base by means of the short projecting pins. The openings in the sockets should have a depth of about 1 in. and a diameter of ⅝ in., and as soon as they are ready a 2 in. length of ½ in. glass rod may be cemented into the central socket, with a couple of 4 in. lengths of the same diameter for the other two.

When this has been done, it will be necessary to prepare two hinged caps for the upper ends of the last-named glass supports. For each of these, mark out and cut a piece of moderately stout sheet brass to the plan of Fig. 73, then bend the piece of metal thus obtained round the glass rod, and afterwards solder the seam neatly together, thus forming a metal cap with two projecting leaves. The tubular portion of the hinge is now formed from another piece of sheet brass, which is marked and cut to the plan of Fig. 74, and then head round a piece of $\frac{3}{16}$ in. brass rod, after which the two leaves are soldered together, in order to make the hinge as solid as possible. The two portions of the hinge thus formed are now riveted together by means of the head, and a short portion of the stem of a brass screw, which is passed through holes bored for its reception through the outer extremity of each portion. When completed, the hinges, which will present the appearance of Fig. 75, should be cemented on to the upper ends of the two outer glass supports of the base, after which they will be ready to receive the two metal arms.

For each of these arms a 10 in. length of brass rod, about $\frac{3}{16}$ in. thick, should be bent in the form of a small ring at one end, and then pointed at the other extremity, after which the pointed end of each arm should be tapped to screw into a small ½ in. brass ball. It is necessary for these balls to be removable, as it is sometimes desirable to screw others in their place. As soon as the arms have been completed, the glass supports to which they are attached may be made a fixture to the base, and when this has been done a small mahogany table, 3 in. in diameter, should be turned in a lathe to the form of Fig. 76, with a short socket on the under-side, which is made to fit the upper end of the central glass stem of the table. A longitudinal or circular recess is now cut in the upper surface of the table, into which a piece of ebonite is carefully cemented, after which the surface must be accurately levelled, and the table finally cemented on to the upper end of the glass supporting stem.

The table should not be cemented into the central hole of the base, as it is sometimes convenient to remove the table altogether for the performance of certain experiments. It is also usual to provide a small screw press, which is capable of being attached to the base in place of the table, as may be required.

This press consists of a pair of small mahogany boards, mounted in a horizontal position on a glass stem, in a similar manner to the inlaid table above described, but provided with a couple of vertical adjusting screws and wing nuts, which are affixed to the lower board at either end. The body through which the charge is to be sent is placed in position between the press, the screws of which are then tightened and the discharge passed in the usual manner. Correctly speaking, the arms of the discharger should be mounted on the supporting stems by means of ball and socket joints, but for all ordinary purposes of the amateur experimentalist the above modification of this form of joint will be found to answer extremely well.

Numerous experiments may be performed by the aid of Henley's Universal Discharger and the Leyden battery before described, the charge being passed through various substances placed upon the table of the discharger. Arrange the arms of the discharger to within about a couple of inches of each other, and then slightly unscrew the ball, and insert a thin slip of tinfoil between them, afterwards screwing the balls up again. Now connect one of the arms with the outer coating of the Leyden battery by means of a short length of brass chain, and then attach another length of chain from the director to the other arm of the discharger. If the battery is now charged and the ball of the director is rapidly brought in contact with the other arm of the discharger, it will cause the entire charge of the battery to be passed through the strip of foil, which is instantly fused up with a brilliant flash.

A slip of gold leaf arranged in a like manner will also be fused, as also will other metals, silver leaf resulting in a bright green flash, and Dutch metal a purple tint. The strips of metal employed for this purpose—which should not exceed ⅛ in. in width—may be readily cut by enclosing the leaf of metal between a sheet of writing-paper, and then cutting the required width by means of a pair of scissors. An ordinary visiting card or a few sheets of note-paper, supported on the table of the discharger between the knobs of the arms, can be pierced by the discharge, which will produce a slight burn on either side of the card. If the knobs are placed nearly in contact on the table of the discharger, and some tow is arranged between them, and then sprinkled with a small quantity of powdered resin, the latter will be inflamed upon the charge being passed.

When the spark is passed in the ordinary manner between the brass balls, it results in a brilliant violet flash, but if these balls are removed and a pair of ivory balls substituted, it will assume a crimson tint, or a pair of copper balls silver-plated will colour the spark green.

Various substances placed upon the table of the discharger, with the arms in contact, will assume different tints upon the charge being passed: rock crystal becoming red, sulphate of barium or lump sugar green, chalk orange, and calcined oyster-shells the prismatic colours, etc.

ON SOME WORKSHOP APPLIANCES.

BY H. J. L. J. MASSÉ.

BENCH: IMPROVEMENTS ON AND UNDERNEATH IT—VICES—SPARE TABLE ROOM—CLAMP—FLAP FOR ADDITIONAL TABLE—TOOL CHEST—GAS SUPPLY.

A DESCRIPTION of some of the appliances I have fitted up in my workshop at different times may be of interest to some of your readers; and as some of the devices are quite inexpensive, they may, perhaps, in some cases, be adopted, or they may supply hints on which other contrivances may be fashioned.

To begin with the bench, as this is an indispensable article in any workshop. Mine is one of the smaller size of German benches, standing about 31 in. high, and measuring 50 in. by 18 in. I found this quite high enough when I began to work only occasionally at woodwork, but found it too low to work at for any length of time, so I raised it slightly from the floor by putting a piece of quartering under each of its two legs. These two legs are really rough pieces of framing, kept firmly in place by two struts, which fit into mortises and are wedged in. On the struts rests a board, on which the jack and trying planes are kept, and below them are a couple of boxes for odds and

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ends of all sorts—bits of leather and bits of wood, all of which are sorted periodically into different boxes for future use. One of the first things I added to the bench was a bench-stop—known as the "Perfect"—which, as many readers of WORK know, is fixed in flush with the bench top. The stop can be adjusted to any height by hand, either under the bench or from the top, and is fixed or released by a half-turn of a screw, also sunk flush with the bench.

Later on I bought and fitted to the bench a joiner's instantaneous grip-vice, a tool which, without any unscrewing, will take in anything, from a sheet of paper to a block 12 in. in thickness, and hold it "like a vice." This vice is all very well for wood-working, but it is quite unsuited for holding small pieces of metal, and it is too low down—being only 35 in. from the floor—to enable one to do much filing satisfactorily. As I had a small parallel bench-vice with 3 in. jaws, which I used to screw on to a table or bench when required, I mounted it on a piece of plane-wood (30 in. by 5 in. by 4 in.), which I had bought for turning, but which, working out rather rough, was discarded. This block, then, with the vice on the end of it, is placed in the jaws of the instantaneous grip-vice, and can be held there at any height most convenient for the job in hand. If the grip-vice is in use, the block can be fixed in the sliding end of the bench, which is in itself a vice, and held there at any height. Sometimes, too, it suits me to sit down with the block and vice held tightly between my knees, and resting on the floor.

Everyone, even the tidiest among us, has sometimes felt how nice it would be to have another table (no matter how small) to hold some small thing that has been just recently cemented or otherwise repaired, well out of reach of everything else. This end I was able to attain by making a table out of an old drawing board, about 2 ft. by 15 in., with pieces of wood screwed to the under-side in the shape of a capital H. The cross-bar of the H is held tightly in the jaws of the small vice on the block, and the block inserted and held in the instantaneous grip-vice. In this way I have ready at hand a table which can be adjusted to any height and almost any angle I happen to want. It has been a most useful contrivance, and as I often like to stand up after a long spell of sitting, it is a real comfort and a great economiser of time: *e.g.*, suppose I am in the middle of a piece of repoussé work or chasing, and the kitchen clock is sent up to be put to rights, with a message that everybody is waiting for it; or a toy is brought in by an imperious youngster, who means to wait till it is mended, the table can be rigged up high and dry above everything else in a moment—there is no clearing away of tools, and no delay in returning to the work originally in progress. I often grip in my big vice a board 4 ft. by 11 in. by $1\frac{1}{4}$ in. when I want the bench temporarily widened for mount cutting, or any large piece of work.

The back of the bench has a lath attached, between which and the bench chisels and files can be put, and to hooks on the legs of the bench two tenon saws and a small panel saw are suspended.

Another useful addition to the bench is an American bench-clamp. It is a difficult tool to describe, but it somewhat resembles an F. The top arm and the upright pillar or shaft are made of one piece of round steel, a little over an inch in diameter. In the end of the arm a screw works, and this screw raises or depresses the lower arm as required. This lower arm is 16 in. long, and moves between four spurs or studs on the shaft; it can thus be brought up close to the shaft or kept 16 in. away from it. The shaft is merely inserted into a hole in the bench—I have three holes in mine, one at each end and one in the middle—and the object to be clamped is put under the end of the movable arm; and then the more turns that are given to the screw in the top arm the tighter the article is clamped to the bench, and the tighter does the shaft hold in the hole in the bench.

This clamp is most useful for holding down a plank flat on the bench while planing or bevelling it, for pressing together two pieces of wood that have been glued, or for holding a thin sheet of metal while turning the edge down on to a wooden shape held underneath. By clamping a piece of board (about 3 ft. long) under it at right angles to the bench a convenient table for fretwork is formed, under which one can sit and move about with perfect freedom.

Another table in my workshop, which is used occasionally for picture framing, mount cutting, but chiefly for photographic and chemical work, is really nothing more than a strongly-built kitchen table, measuring 6 ft. by 3 ft., which stands against a wall. Seeing that after giving up a foot all along its width to a chest or nest of drawers, the space left is sometimes insufficient, I have a plank which, by means of loose edge hinges (*i.e.*, hinges which can be unmounted in a moment), can be fitted to or removed from the table with the greatest ease. This plank is kept in its place by a small button at the end of the table (otherwise the hinges might work loose), and is held up by two arms which, being pivoted at both ends under the table-top, need only to be pulled out at right angles to the edge of the table to make a secure support for the flap.

My tool-chest takes the form of a cupboard (4 ft. by 3 ft. by 11 in.), which I have mounted on two boxes as pedestals. The boxes are placed on their sides, and their open tops which give on to the room form most convenient receptacles for such bulky things as boot-lasts, mitre-cutters, cramps, and the like. Between the two boxes there is a space, in which I keep a box for larger oddments in brass or copper.

The gas arrangements are the outcome of much planning. The gas bracket is a straight and rigid iron pipe with a connection for flexible tubing fitted to the end. By means of this I am enabled to run three tubes, each with a separate tap, from the one tube which constitutes my gas "main." The top pipe has a "Kinnear's" patent jet attached, a most useful invention, as it enables me to turn the gas down to a tiny bead, in case I am called away from my den, and it needs no relighting on my return. It is absolutely necessary in printing on alpha or bromide papers. This burner is the chief illuminating agent in my workshop.

Tube No. 2 is carried down by red india-rubber tubing to a position just above the bench, where it is attached to a double-swing gas bracket, about 22 in. long, fitted with a Swedish burner, opal globe and shade. With this I can work very comfortably at night and on dark days, as I can regulate the shadows that fall on any work to a nicety, and it is a good light for reading purposes.

Tube No. 3 is a longer length, nearly three yards, and is fitted to my blowpipe—a tool I could not do without—worked by one of Fletcher's foot-blowers. My object in having such a long tube is that I can have my blowpipe wherever I like in the workshop, or in whatever room I have occasion to transport the whole apparatus, for soldering or what not. I can also, by removing the blowpipe, fit the tube on to a gas standard on the lathe, where a good light is indispensable for good work. I can also, when in a hurry, very easily light my fire by inserting the lighted gas tube in among the coals; in this case no laying of the fire is required.

A CLEVER CHAIN-COUPLING LINK.

BY JOHN W. HARLAND.

IN looking over my diminutive "marine stores," into which I throw all items of metal, broken tools, screw-bolts, nuts, etc., in the hope that "they may come in useful some day," I came across a link of chain which, on examination, struck me as a very valuable invention. I cannot account for its coming into my possession; it bears no mark; it may

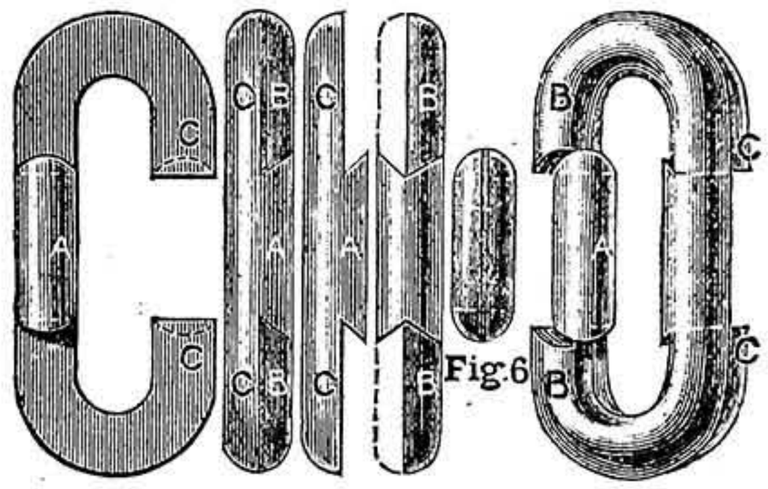

Fig. 1. Fig 4. Fig. 2. Fig 3. Fig. 5.

Chain-Coupling Link.

have been patented, for aught I know. I have shown it to several people who ought to have seen it if it had ever been in general use, but it is as new to them as to me. Perhaps someone of the hundred thousand readers of WORK might know something of it. At any rate, it would be invaluable for military purposes, and as a reserve link in case of broken chains for railways, wharves, carriers, etc.

My sketches above show its beautiful simplicity. Fig. 1 is one of two exact counterparts of the form of a letter C. Between the points c, c, is a gap in each. Fig. 2 shows side view of same; it is in form (in profile) a half link with a portion of dovetail shape left on, full thickness, and round to fit the gap of the counterpart half link as shown fitted together in Fig. 4, Fig. 3 being the said counterpart. Fig. 5 shows these two half links slided almost into place. It is evident that when the neighbouring links are placed within one half link, and the other is slid into place, the stress on the chain will maintain the two half links in position so that they can never slip undone; the dovetail piece, A, being solid, supports the point, C, of the other half link, B, and, being dovetailed, all strains tend to press the two flat surfaces closer together laterally—binding them into one link, as it were. Fig. 6 is an end view of link with dotted lines showing dovetailing when in closed position.

Such pairs of half links could be cheaply made by machinery, and if made in steel would be stronger, if anything, than the links of the chain itself; at any rate, it would be a pity that so good an idea should be left to perish in obscurity. I shall be glad to know if any reader of WORK has at any time met with a link similar to this.

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MAKING THE BEST OF A BAD HOUSE.

BY MARK MALLETT.

The Dining-Room—The Fireplace.

The Dining-Room.—This room, which opened from the entrance-hall on the side opposite to the study, had, at the time when I entered upon the house, a decidedly more civilised appearance than that room. Some previous occupant had done his best to modernise, and, according to his lights, to improve it. The wide, open fireplace which it had formerly possessed (of the same kind as that in the "den," but on a somewhat larger scale) had been walled up, and instead of it had been inserted a rather handsome grate of the *delirium tremens* pattern in vogue thirty years ago. I apply this name to that particular style from the singular facility with which its cast-iron ornamentation resolves itself, when the spectator's nerves are a little out of order, into horrible monsters. By this alteration the length of the room had been diminished by some 3 or 4 ft., though it was still of fair size, viz.. 18 ft. by 15 ft.

The walls had been papered. They had skirting boards, but no cornice. The doors, of which there were two, one from the hall and one opening to a passage leading to the kitchen, were panelled and fairly good. The one large window had once had handsome stone mullions, but these had been removed, probably for the sake of more light, and wooden ones of far less bulk substituted.

The Fireplace.—With one of the above "improvements" I would most gladly have dispensed, and that was the modern fireplace. The old open chimney, situated as it was at the end of the room and immediately opposite to the chief doorway, might have been made a highly effective feature. But restoring it to its original form was out of the question. I had to accept it as it stood and make the best of it.

The modern mantelpiece which had been put up was, if not ornamental, at least inoffensive. It was of blackened slate. On consideration, I resolved not to remove it; but if the reader will refer to Fig. 18, which represents this fireplace as it now stands, he will see that it has been pretty effectually concealed. The present mantelpiece, as there shown, is of carved oak on a background of ebonised pine; there are some old scraps in it, but the work is mostly my own. I made a frame of black wood, large enough to encase the slate jambs and lintel, and attached to it my twisted pilasters and carving. I then drilled holes into and plugged the slate, and fixed up the woodwork by screwing through the pine boards into the plugs, and thus succeeded in making my new mantelpiece perfectly firm and secure, without the trouble and mess of pulling down the old one, and without, what to me was a point of importance, the necessity of calling in the mason.

My new and larger shelf lies on the old slate one, which is hidden by a moulding fixed to the under-side of the shelf-board; a couple of strong dowels into the wall at back hold the new shelf in place. It is still further secured by the super-mantel, which is screwed to plugs in the wall, and rests upon and is dowelled into it.

I must admit that the carving about this fireplace cost me considerable labour and time, perhaps more than most people would care to devote to such a purpose. But I imagine that one of its most telling features, namely, the twisted shafts, might very effectively be combined with turned and joinery work only, so as to be carried out more quickly, and by anyone who did not carve. These twists were cut by hand (not in the lathe) and they are readily made. The way to set them out is to wrap strips of paper spirally round the wood; a draft is then made with the saw up the hollows, which can afterwards be quickly worked out with the gouge, the work being finished with the file and glass-paper.

If, instead of a plain mantelshelf, one covered with velvet and edged with fringe should be preferred, such an arrangement will be found perfectly suited to the design, since a fringe 4 in. or 5 in. in depth will hide the mouldings merely, and not the carved work.

Fig. 18.—Dining-Room Fireplace in Carved Wood.

CORK WORK.

BY J. W. W.

Old corks are generally considered useless litter, only fit to be burned, but there are few things that lend themselves more readily to the adornment of various articles; and anyone with an average amount of patience may turn out work that will, by its beauty, surprise both himself and his friends. Of course, I know there are many readers of Work who will consider themselves above this kind of work, but there are many more who, like myself, are willing to try their hands at any kind, so long as it goes toward the beautifying of their homes.

And now, having said so much in favour of old corks, I will proceed to give a few simple designs for those who should feel desirous of trying their hands at this kind of work. First, as regards cutting the cork: an old, thin-bladed table-knife, well sharpened on a rough stone, is the best tool, as far as my experience goes—and I have tried everything almost, from a small dovetail saw down to a pocket-knife—and should be used with a quick, firm pressure; it is impossible to cut cork by hitting or chopping.

Fig. 1 is a pretty design for a picture-frame. For this you will require a wood foundation, made out of $\frac{1}{2}$ in. by $\frac{3}{4}$ in. stuff, rebated out $\frac{3}{8}$ in. deep, and then half-checked together, leaving the ends 2 in. long—the broad side should be to the front; cut your corks like Figs. 7, 9, and 10, glue the three-cornered pieces on the sides close up to the front, and the half-rounds on the front close up to the edges, then glue the pyramids on down the middle; the three-cornered and half-round pieces are $\frac{1}{8}$ in. thick, and the pyramids are $\frac{1}{2}$ in. square at the base. For the corners where the frame is half-checked together, cut four flat-topped pyramids $\frac{3}{4}$ in. square at the base, and about the same height; it will greatly improve the appearance of the frame if these are blacked, but you must do it before they are glued on, as it is a difficult job to do after without smearing the others. The frame should now look like the corner shown at Fig. 1, and may be washed over with a thin coat of glue, to stop the pores; after which, it should receive two coats of shellac varnish, as that shows to more advantage than the more transparent kinds.

Fig. 2 is a design for a basket: filled with African everlasting flowers and prepared moss, this makes a very pretty ornament for a small bracket. Select a nice oval cocoanut, and cut it as shown, leaving the

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handle about ⅜ in. wide (care must be exercised in extracting the nut, or you will break the handle off); this is covered with corks cut like Fig. 8, a row being glued on the top edge, another round the outside close up to the top, then four festoons, as shown. For the legs, gimp three corks, cut one end to a bevel, so that it fits the side of the nut, and glue them on equal distances apart. The handle and open spaces should be covered with cork cut very fine, or rice may be used for the same purpose—but if it is, the cork must be varnished first, as the rice looks best left as white as possible, and should be done with transparent varnish.

Fig. 3 is a cover for an ordinary flower-pot. To obtain the correct size and shape for this, wrap a piece of paper round the pot it is intended to cover, letting it overlap ½ in.; then cut it out in stiff cardboard, glue the overlapping edge, and tie it round the pot till dry. Now cut a circular piece for the bottom, with a ½ in. hole in the centre to allow the drainage to escape; a few strips of calico should be used in gluing this on, to make it more firm. The same design is used for this as for the basket, with the exception that the festoons are continued right to the bottom, one falling from the middle of the other; fine-cut cork or rice is used for filling in the spaces. If the pot is intended to stand in a saucer, the bottom may be left off, if thought well.

Fig. 4 is a very pretty design for a pair of spill-holders. The foundations for these are made out of stiff cardboard; the shape of the front is shown at Fig. 5, the dotted lines showing where it is turned up for the sides; strips of calico should be used to make the joints more firm. They are covered with corks cut like Fig. 8, a row being glued round all the edges and angles; the open parts are filled in with rice—bearing in mind to varnish the cork work first with shellac varnish, the rice being done after with transparent. A bow of ribbon is tied round the neck, and a loop attached to the top to hang them up by.

Fig 6 is a basket for ferns: any old box may be utilised for the foundation. A cigar-box does very well, if only a small one is wanted; it is covered with half-round corks, (½ in. thick) and pyramids (½ in. square at the base); a row of pyramids is glued on the top edge, then a row of half-rounds round all the sides; next a row of pyramids, and so on till there is only a small space left, which may be filled up with cork cut very fine. The feet are round pieces of wood driven into holes bored in the bottom, and then covered with fine cork; the handles are fastened to the inside of the ends with small screws, the cross-bar being fixed in place with a fine brad driven through all three sticks, then covered with fine cork, like the feet.

Of course, there is almost an endless number of things that may be ornamented with cork, but, having said so much in favour of cork work, I will leave the readers of WORK to follow their own taste, and exercise their ingenuity in finding out and fashioning articles that lend themselves conveniently to this mode of decoration. With regard to the execution of the work, or rather the cutting of the cork that is used for its decoration, the instructions given above must always be held in remembrance and acted on. Cork is in itself a material which is far more difficult to cut than harder substances, owing to its spongy and yielding nature; therefore it is imperative that a sharp tool should be used, and that the tool itself should be kept well sharpened. The cork worker should endeavour to provide himself or herself with cork of tolerably close texture, such as is used for phial-corks, and not of an open, spongy-like character.

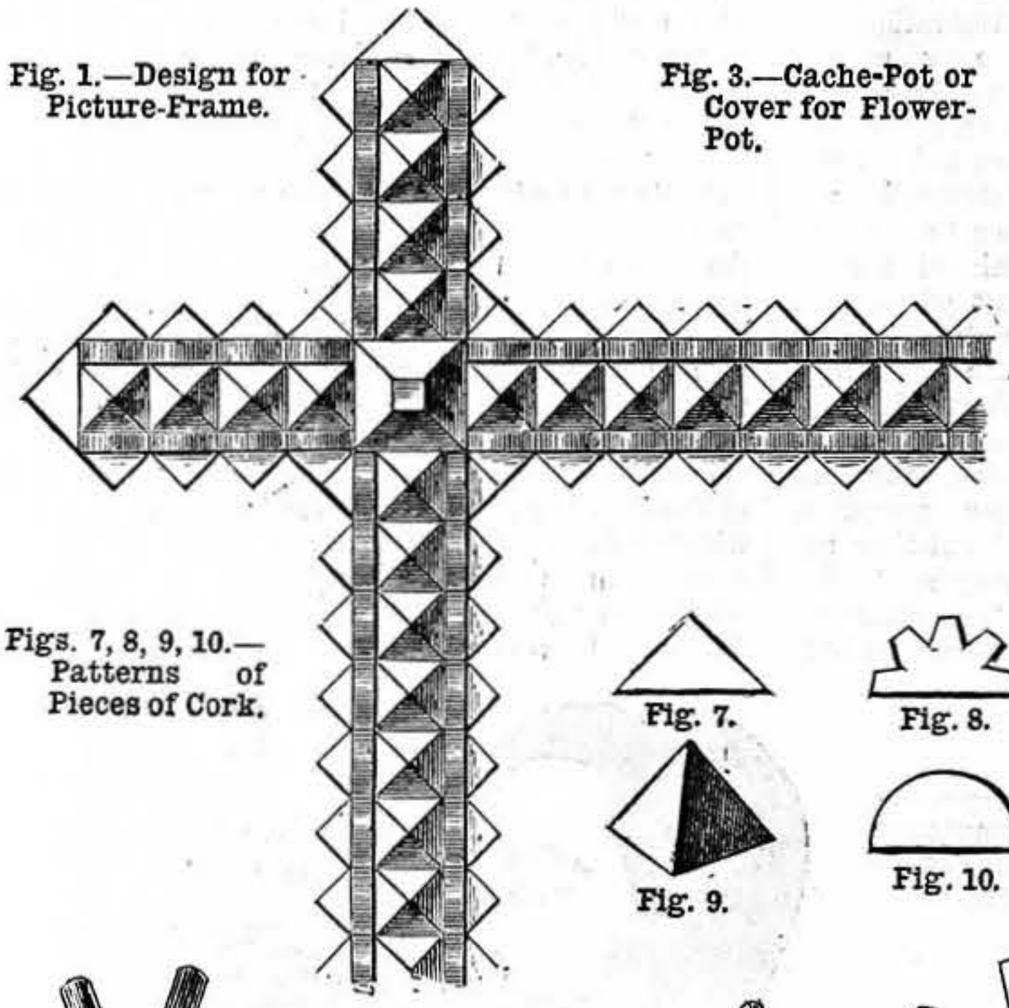

Fig. 1.—Design for Picture-Frame.

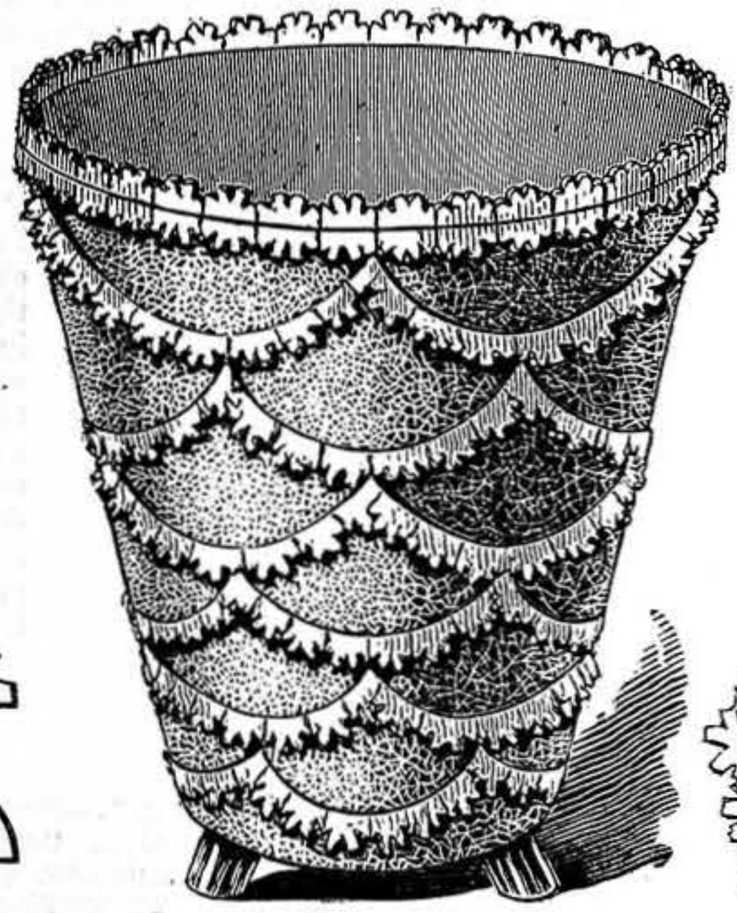

Fig. 3.—Cache-Pot or Cover for Flower-Pot.

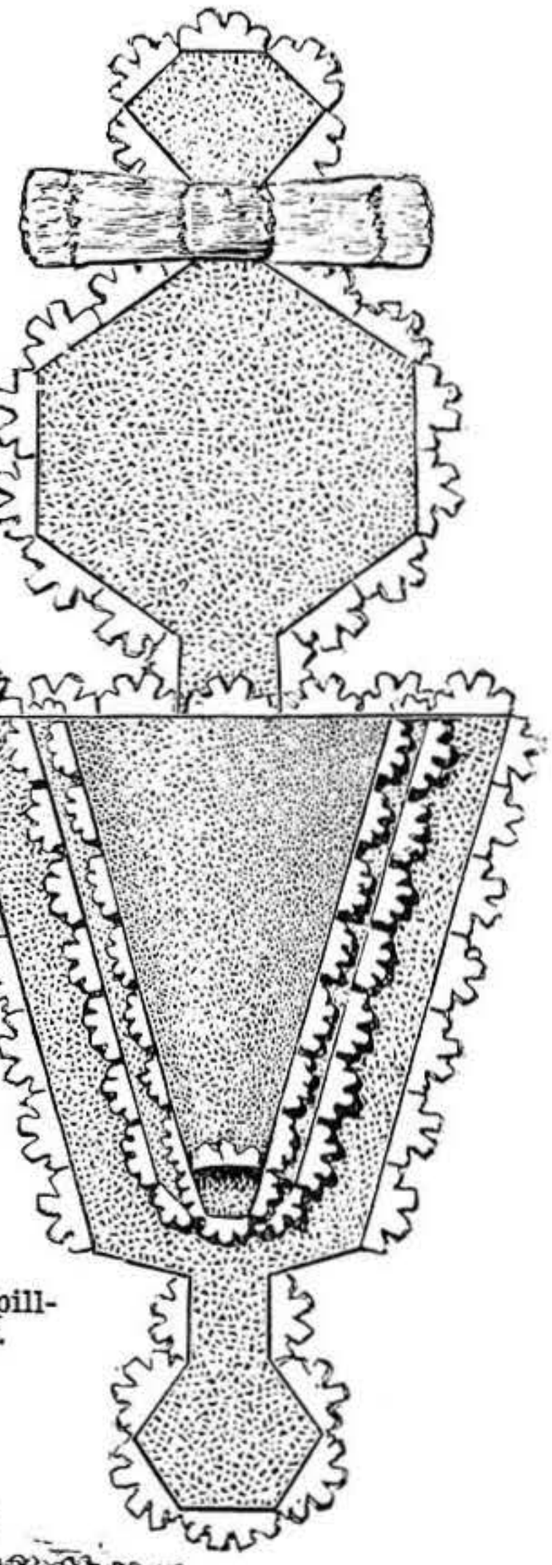

Fig. 4.—Spill-Holder.

Figs. 7, 8, 9, 10.—Patterns of Pieces of Cork.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

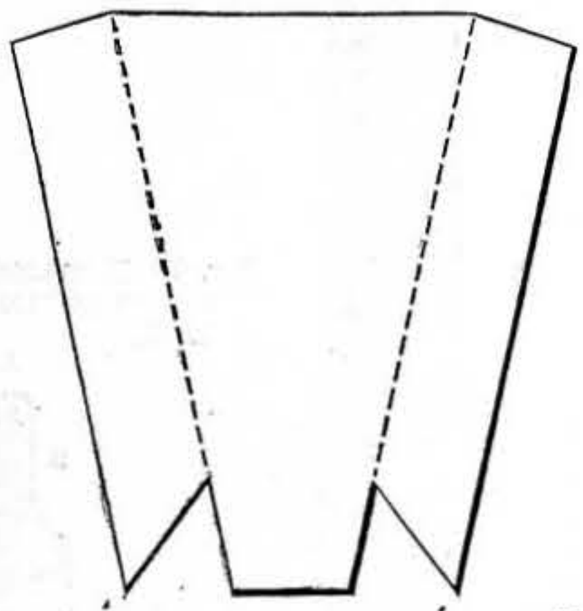

Fig. 5.—Shape of front of Spill-Holder.

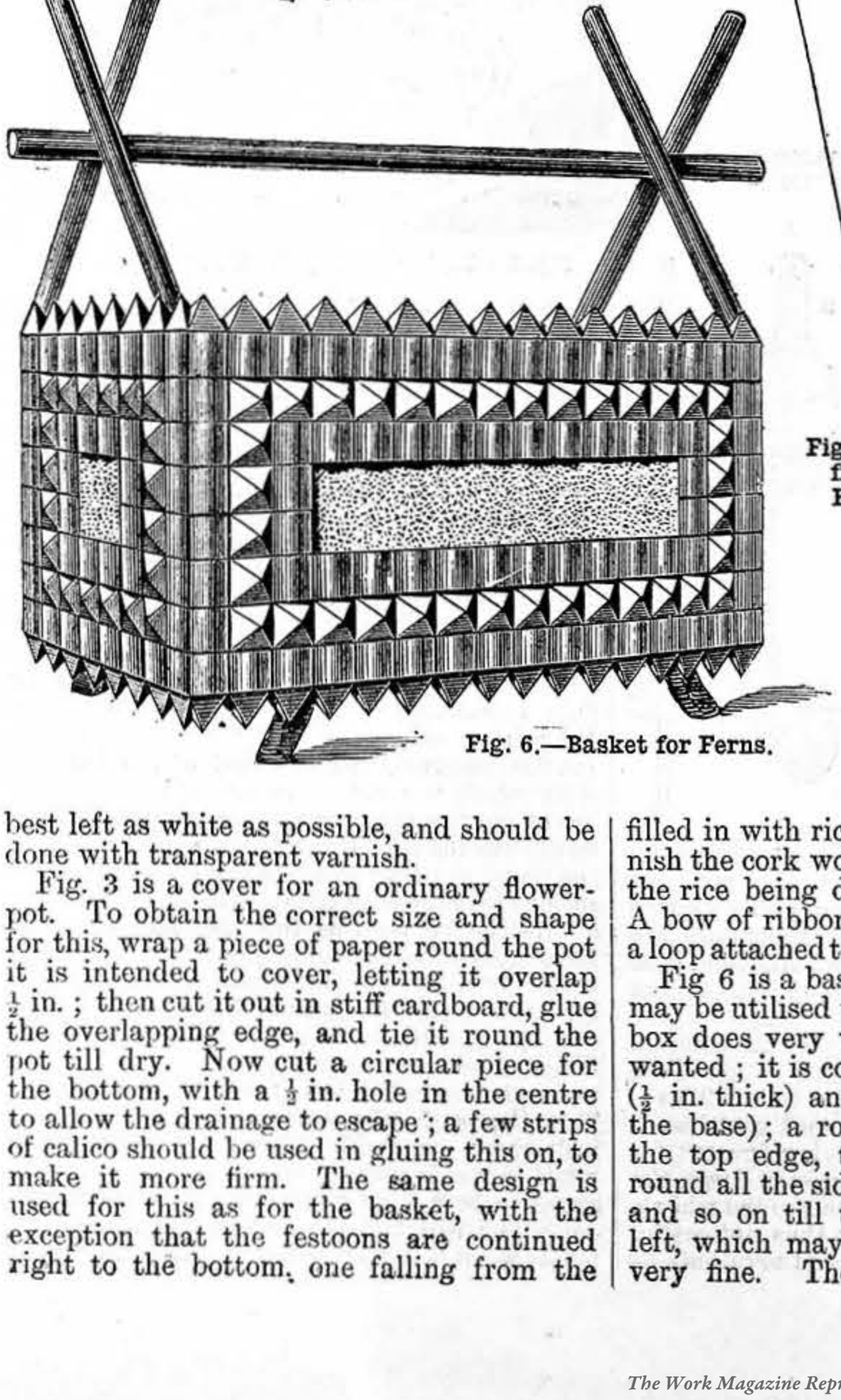

Fig. 6.—Basket for Ferns.

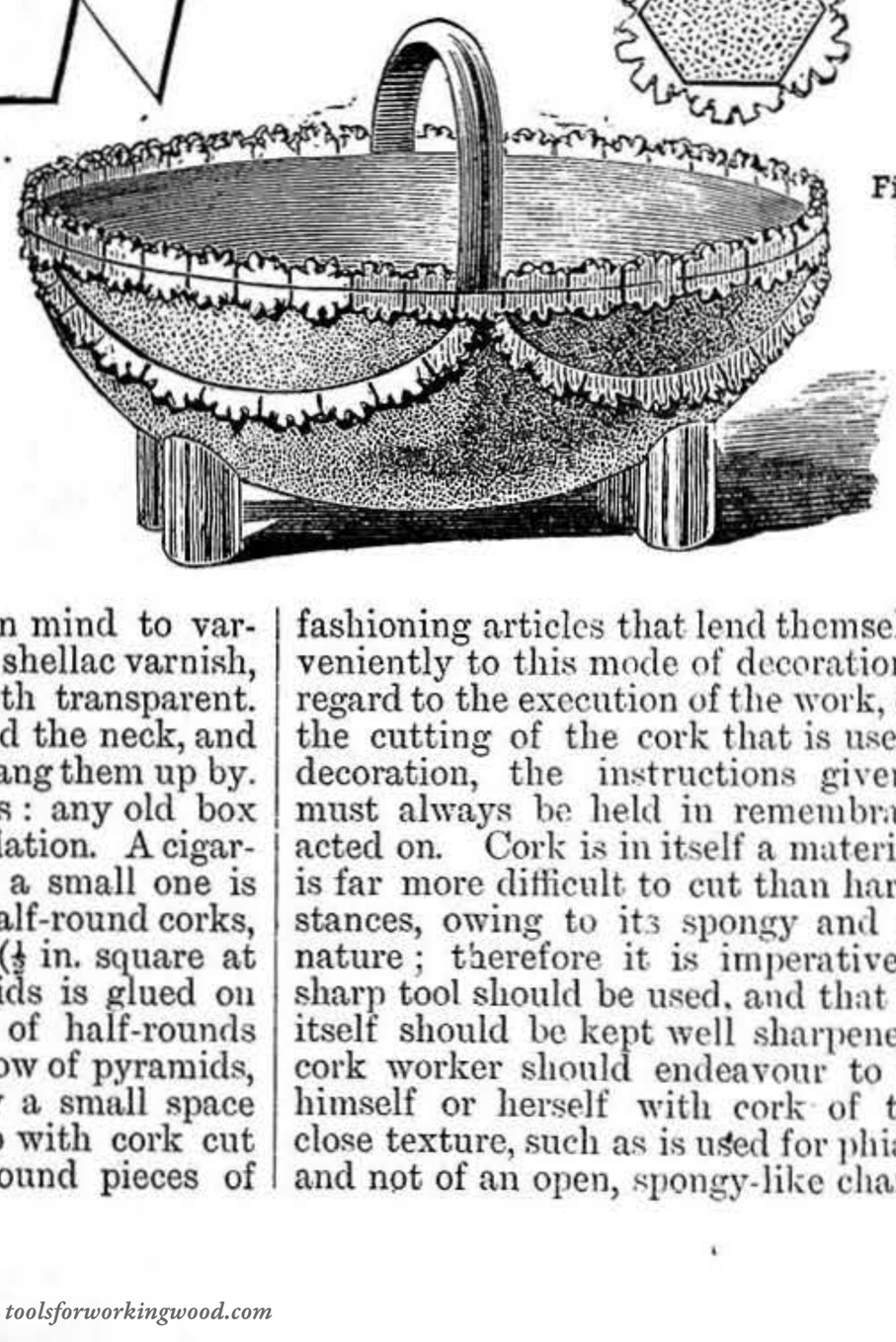

Fig. 2.—Design for Basket.

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SHORT LESSONS IN WOOD-WORKING FOR AMATEURS.

BY B. A. BAXTER.

MOULDINGS, BEADS, OVOLOS, AND OGEES.

A FREQUENT use of beaded edges is where boards are brought into contact, but not glued. If a large surface is to be boarded, it would be almost impossible to get timber so dry as to remain perfect joints; so in the familiar form of matched lining we have a frequent use of beads; when the boards shrink a little it gives the appearance of another quirk, making the bead look more symmetrical.

Around sashes, beads are prepared and added to the frame, making a neat finish, yet easily removed in the event of a broken sash-line. The amateur will more often require beads to lighten the appearance of his door-frames, and to break the continuity of folding doors, etc. It is advantageous to have beads to definite sizes, and to see that when the iron is fairly set the bead works true to its name, because frequently the parts of a framing have to be so fitted that allowance for beads, rebates, or mouldings must be made on the shoulders.

Sometimes the worker is able to evade this condition, as in sashes where the moulding on the face side is exactly compensated by the rebate for the glass, it is obvious that the rebate can be made to any size, and to make it the depth that the moulding removes leaves the setting-out of the work "square."

I mention these considerations because the amateur will now be buying bead and moulding planes, and he is advised to get them true to size; if, however, he has planes in hand, he had better make a set of mouldings with them, and keep the set thus made for reference.

The mention of sashes reminds us of ovolos. A variety of shapes and sizes of mouldings are covered by this term, which is derived from ovum, egg. The special feature of all these mouldings is some resemblance to a quarter of an ellipse; some, however, are founded on the quarter circle; usually the curve is detached from the flat surfaces by narrow flats, called fillets. If these flats are large in proportion to the moulding, they are to some eyes very ugly, and the quarter ellipse as a basis for the moulding is much more graceful than the quarter circle.

Another useful moulding is the ogee. This, which has a great variety of forms, consists of a hollow and a rounded surface in close contact, and melting, as it were, one into the other.

Many of these mouldings are—and more were—worked by the use of hollows and rounds: a useful set of tools, which will not often be required by the amateur. In such cases one or two hints may be of service. Prepare the stuff truly, marking out on the ends the profile required. All straight lines on the ends should be brought to the surface and marked thereon, care being taken to mark the moulding in a true plane—*i.e.*, not "winding." Use a plough if much wood is to be removed, and with rebate planes work the straight or flat portions, then with rounds work the hollows, finally using hollows to make the round members of the moulding. In cases where the moulding—as in a cornice—is set forward, the bevels at back should be made before using the hollows and rounds, and special care should be exercised to make sure of a true surface, for upon this largely depends success in mitring the moulding when finished.

OUR GUIDE TO GOOD THINGS.

*** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

112.—THE HOMACOUSTIC.

THE instrument which bears this name, and is represented in the accompanying illustrations, is a new speaking-tube instrument constructed after Cutmore's patents. It is claimed for it that when used in connection with speaking-tubes, it entirely supersedes, for indoor purposes, all existing arrangements for inter-communication, including even the telephone, over which it possesses many special advantages. Taken with reference to speaking-tubes, it completely supersedes the old-fashioned mouthpieces and whistles, and does away with all the features that render them so objectionable—the principal of which is the necessity of blowing into the pipe in order to set the air therein in motion, and so sound the whistle at the other end of the tube. This is brought about by the bottle-shaped contrivance shown in each of the accompanying figures; for when the plunger at the top is pressed down, the pressure displaces the air and causes the whistle to sound, the instrument being thus automatic. When the whistle has been sounded to call attention at the other end of the tube, the operator lifts and holds to his ear the pendent tube which is seen hanging from the appliance, and speaks, when necessary, into the funnel-shaped orifice which is opposite the mouth. This arrangement entirely does away with the necessity and inconvenience of applying first the mouth and then the ear to one and the same orifice, as in the old-fashioned whistle-fitted speaking-tube, and messages can be simultaneously transmitted and received, and conversations can be carried on as if the speakers were in the same room and speaking in the ordinary way; and there is no inhalation of the breath injected into the tube by the speakers, as must inevitably occur when the old form is used, and the whistle is always in position. The mode of using the instrument is clearly shown in Fig. 3, and the Homacoustic itself, when not in use and when attached to a wall, is exhibited in Fig. 2. Of course, it will be readily understood that, in this case, it is only possible to operate on a single tube with the instrument. The different parts are as follows: A is the whistle placed at the top of a hollow plunger, B, which, when pressed, is forced into the globular metal casing, C, in which is placed an indiarubber ball, which, by its action, restores plunger and whistle to its place when the pressure that has been applied is removed; D is the mouthpiece into which the operator speaks, and projecting from the centre of the tube is a fixed hollow cane fitted with base, which acts as a baffle when the whistle is being sounded, and prevents the escape of the air otherwise than through the whistle itself; E is the flexible tube which is applied to the ear.

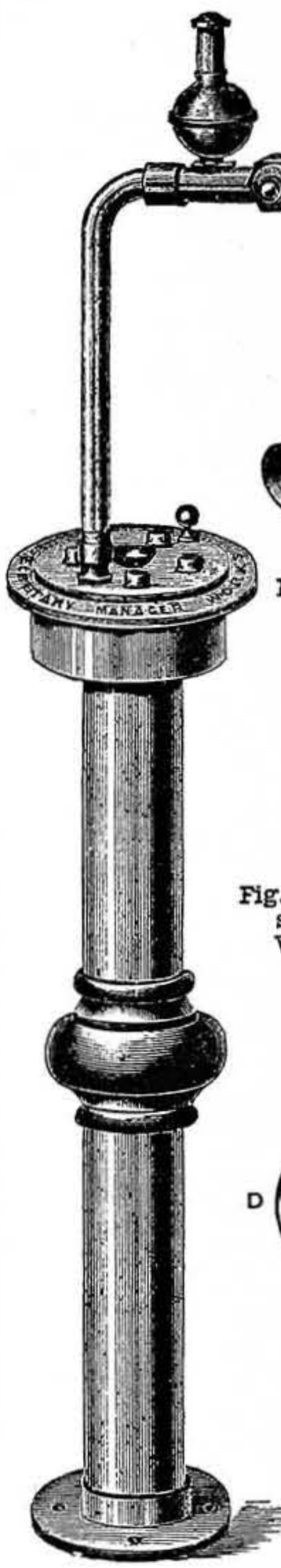
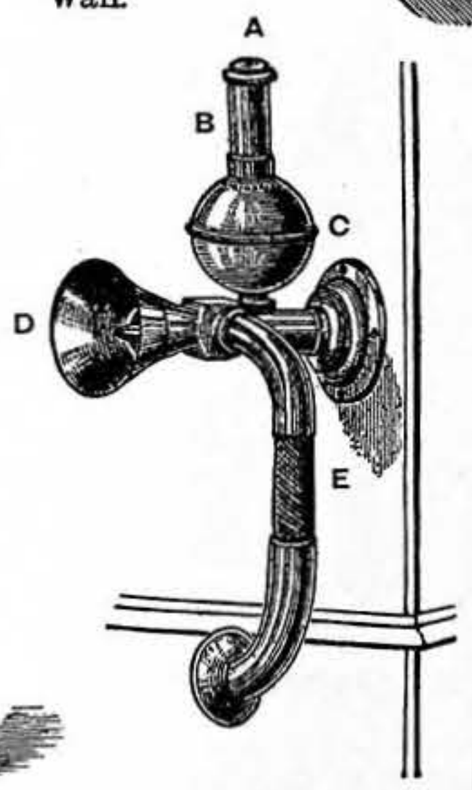


Fig. 1.—Homacoustic with Commutator mounted on Pedestal for Floors.

Fig. 2.—Homacoustic shown as fitted to Wall.

Fig. 3.—Mode of using the Homacoustic.



But one of the greatest advantages possessed by the Homacoustic is shown in Fig. 1, from which it may be seen that a single instrument is sufficient for operating on a number of tubes which are collected in a pedestal fixed to the floor and have their upper ends fitted into a strong metal base, the Homacoustic itself being fixed into a small circular switch-plate or commutator, which can be moved at pleasure to the right or left, thus bringing the end of the Homacoustic immediately over the orifice of the tube connected with the place or apartment with which communication is desired. It will be noticed that the room or department with which each particular tube communicates is indicated by lettering on the band in which the plate carrying the Homacoustic revolves, and the part of the building with which it must be connected by the simple act of moving the plate and bringing the instrument over the tube which is connected with it, is shown by an indicator shutter in the plate, which springs up as soon as the whistle is sounded. In a brief notice, such as this necessarily is, it is impossible to describe minutely the whole of the means by which the instrument is brought into use; but enough has been said to show its nature and its importance as an invention. It was invented and first used in Australia, and is now under the control of the Homacoustic Speaking-Tube Company, who possess patent rights in the instrument apparently in every country in the world in which such rights can be obtained. It seems to be a very meritorious instrument, and one which will find favour with the mercantile public when better known. THE EDITOR.

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SHOP:

A Corner for Those who Want to Talk It.

*** *In consequence of the great pressure upon the "Shop" columns of* Work, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

Central Foundation Schools Carpentry Class. — A Correspondent writes:—"You may be glad to note that in the exhibition of carpentry and turnery recently held at the Central Foundation Schools, Cowper Street, London, several simple articles shown had been made from drawings which have appeared in Work. A coal-box, a lady's table, a model kitchen table, a screen secrétaire, an easel, and two writing cabinets were among the simple articles made by members of the Carpentry Class under the direction of Mr. R. Scotter, the instructor; while others were being made during the exhibition at a bench near the stall. The other articles exhibited might be called specimens of the application of drawing to woodwork, designed to show how useful articles may be made from simple geometrical designs. Various examples of turnery were exhibited, several made at a lathe attached to the carpentry stall during the exhibition. I was glad to see the interest these boys had evidently taken in their work, and trust they may develop in after-life the taste which they have had opportunities of acquiring for making practical use of simple tools."—[We are glad to receive such satisfactory testimony as this of the successful adoption of technical training in schools, this being a matter which will always have our encouragement.—Ed.]

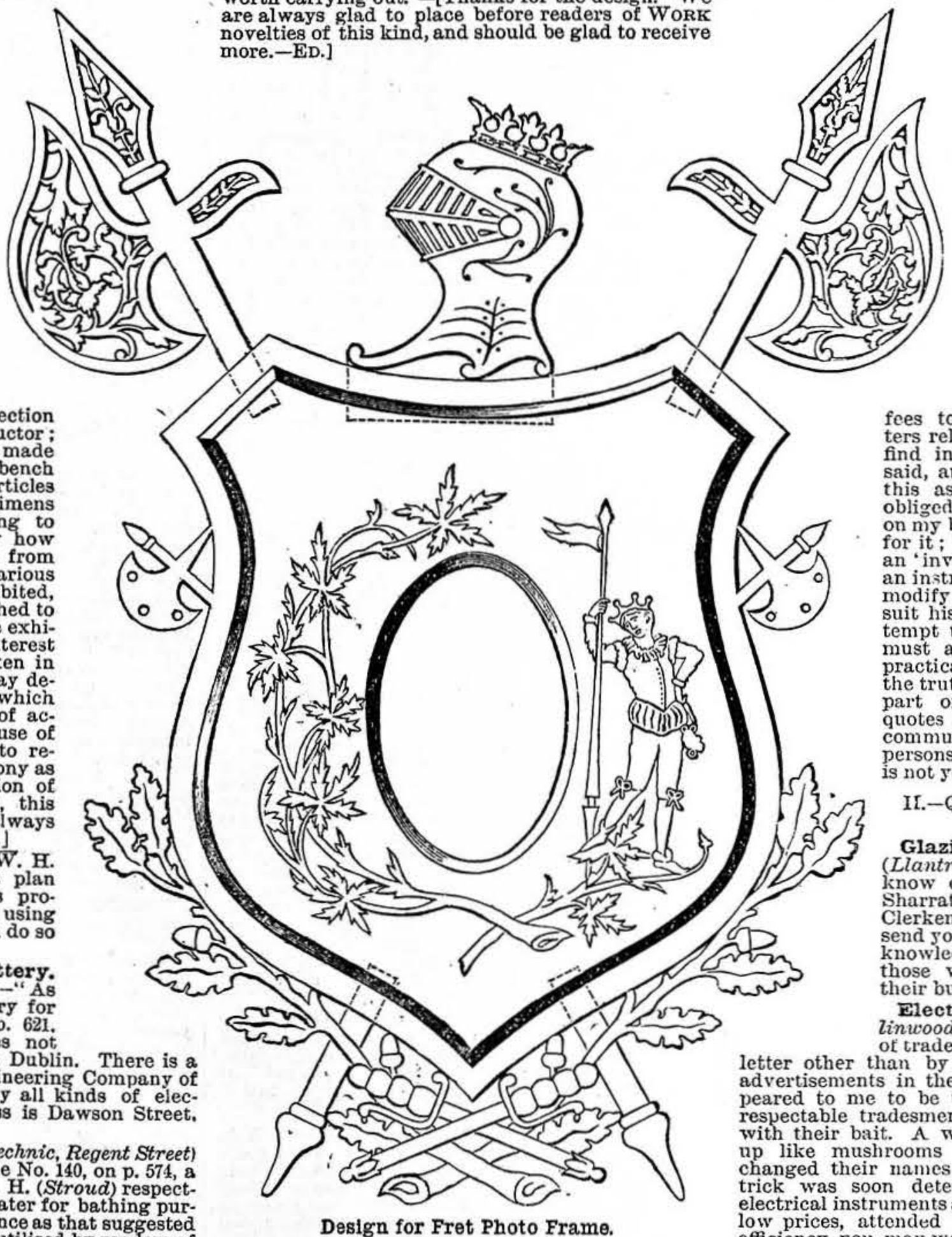
Bicycle Anti-Vibrator.—W. H. P. (*Tottenham*) writes:—"This plan (see Work, p. 510, No. 136) is protected by patent, and anyone using or making the application can do so only by licence."

Electric Night-Light Battery.—F. G. M. (*Dublin*) writes:—"As regards the question on battery for electric night-light in Work, p. 621, No. 143, G. E. B. says he does not know of any electrical firm in Dublin. There is a firm called the Electrical Engineering Company of Ireland, Limited, who supply all kinds of electrical appliances. The address is Dawson Street, Dublin."

Bath-Room Air.—B. (*Polytechnic, Regent Street*) writes:—"I notice in your issue No. 140, on p. 574, a reply to Round O (p. 414) by C. H. (*Stroud*) respecting a method for warming water for bathing purposes. As such a simple appliance as that suggested by C. H. is likely to be largely utilised by readers of Work, may I, if you think the matter of sufficient interest to your readers, utter a few words of warning in connection with the ventilating of any room in which such an appliance is to be used? The bath-room is usually one of the smallest rooms in the house, and bathers, on entering a bath-room, invariably close the door and window so that they will not catch cold from draughts; then, so soon as they have stopped free access of air, they commence to strip while the water is getting hot. Now, by stopping the free entrance of air into the bath-room, it follows that the air left in the room is rapidly rendered impure by the inhalations and exhalations of air by the bather, and is made absolutely poisonous by the lighted charcoal in the stove using it for the purposes of combustion. Thus the pure air which the room had contained is rapidly replaced by the exceedingly impure products of combustion, formed by oxygen combining with the free carbon from the burning charcoal and forming carbonic acid gas, and, in smaller proportions, the very dangerous carbon monoxide. To ensure safety while bathing, it is necessary to either remove the stove out of the room altogether or else fit it with a loose cover to which a socket is attached, and this could be connected with a pipe, which should be so arranged that it would pass the products of combustion out into the open air. That there is very great danger in using these appliances when not properly ventilated is proved by the number of deaths which have occurred while using similar kinds of bath-heaters during the last few years."

Locks.—Brass (*Wolverhampton*) writes:—"Two slight mistakes appear in my reply to J. G. (*Bloomsbury*) (see 'Shop,' p. 590, No. 141). In the first two addresses the letters *E.C.* should be omitted, as they are wrong and may mislead someone. The addresses are all of Wolverhampton, as stated further on, but at first sight one would think London was referred to."

Fretworker's Photograph Frame.—A. D. (*Monkwearmouth*) writes:—"I submit herewith an original design for a photo frame, which some of the fretwork readers of Work may find useful and worth carrying out."—[Thanks for the design. We are always glad to place before readers of Work novelties of this kind, and should be glad to receive more.—Ed.]



Design for Fret Photo Frame.

Hand Saws.—Chopstick writes, in reply to A. R. (*Scorrier*) (see p. 603, No. 142):—"I beg to inform him that he has read my former letter in quite a different way from what I intended it. If he looks again, he will see that I said nothing about the *rake* of the teeth, but was simply referring to the *shape:* which is quite a different matter. I was simply trying to do away with the ridiculous fancy shapes mentioned in the article. As to the proper *rake* of the teeth, that, of course, must be governed by the experience of the user, as an experienced man can work a saw with considerably more rake on than a novice; but the more the rake the faster it works, and also the more likely it is to run out of its course. A. R. mentions strength, but that is of very little use without experience, and that he will know as well as myself. He also seems to doubt my experience; but I can tell him that I have for this last twenty years sharpened all kinds of saws, from the dovetail to the pit saw in hand-working saws, and from a 4 in. to a 66 in. circular, and also band saws for steamwork. I began sawing in the pit when fourteen years of age, and had plenty of cross-cutting logs at the same time—and even younger; and if I had A. R. at one end of the cross-cut saw, and myself at the other, with an elm-tree 4 ft. in diameter between us, I could do more to convince him of my experience in cutting logs than I ever hope to by writing. However, I think he is a very good man at the job, though we do not both think alike; but I take it all in good part, and whatever he may say, I shall not write again on this subject unless the Editor wishes it. In reference to a former letter of A. R.'s, I assure him that I have written nothing, nor shall I write anything, except what I know to be true and practicable, as I certainly would not lead anyone astray. If ever I happen to be anywhere near Scorrier, I will look up A. R., and then, I have no doubt—no shadow of doubt whatever—that we should come together in some of our opinions, and part better friends than we met."—[This correspondence must now be closed."—Ed.]

Patent.—C. E. (*London, N.W.*) writes, in reply to S. E. (*Upper Clapton*) (see p. 587, No. 141):—"Our facetious friend Artemus Ward gave a very sound piece of advice when he said, 'Don't prophesy unless you know.' I see in the first column of 'Shop' (p. 387, No. 141), S. E. says I have 'made a serious slip' in one of my communications, and therefore he hastens 'to correct it,' and says, 'If you or any of your readers rely upon this particular statement of his, they may regret it when too late;' but he may rest assured that I am *not* 'ready to admit my error in this case.' Now, if S. E. will just be plucky enough to invest one small sixpence in the purchase of the Patent Office 'Rules and Regulations,' which contains the fees to be paid on the various matters relating to patents, he will there find in print exactly what I have said, and I suppose he will accept this as correct. I am extremely obliged to S. E. for his kind solicitude on my behalf, and beg to thank him for it; but as he describes himself as an 'inventor,' and sets himself up as an instructor of the public, I will just modify Artemus Ward's advice to suit his case, by saying, 'Don't attempt to *teach* unless you *know*!' I must also thank him for giving a practical illustration in himself of the truth of what I have said in that part of my statement which he quotes at the commencement of his communication. Truly the race of persons ready to do what angels fear is not yet extinct."

II.—Questions Answered by Editor and Staff.

Glazier's Diamond. — W. T. (*Llantrisant*). — The only firm I know of is a London firm — viz., Sharratt & Newth, Percival Street, Clerkenwell, London—and you can send your diamond to them with the knowledge that you are sending it to those who thoroughly understand their business.—E. D.

Electric Swindlers.—G. T. (*Hollinwood*).—I do not know the firm of traders mentioned by you in your letter other than by name. I have seen their advertisements in the papers, but these have appeared to me to be too tempting to be those of respectable tradesmen, so have not been caught with their bait. A whole batch of them sprang up like mushrooms a few months since, and changed their names every few weeks, but the trick was soon detected and exposed. When electrical instruments are advertised at ridiculously low prices, attended by absurdly high claims of efficiency, you may well expect the whole to be a swindle, and the advertisers a gang of electric swindlers. Such scoundrels ruin legitimate trade by destroying public confidence, which is the very soul of trade. When men order goods and do not pay for them, or take money for goods they do not supply, or in any other way obtain goods or money under false pretences, they are thieves, and should be treated as such by all honest men. I should like to see all such swindlers well scorched by public exposure in the newspapers. I should advise you to sue them for the money at once, and in future only deal with men of standing and known character, and who have *bonâ-fide* business premises and addresses.—G. E. B.

Wooden Mole Traps.—J. J. (*Cumberland*).—The best plan for J. J. is to make his own traps. This is not a difficult matter to do.

Tagging Machines.—F. B. (*Leek*).—You wrote a second time before the information you needed could be obtained and printed.

Photos on Metal.—A. W. (*Parsonstown*).—Yes, plates are specially prepared for photo zinco work, but only so far as the flatness and substance of them go. Most have secret methods of working, so very much depending on skill rather than formula. A method frequently used to print an image on

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bichromated gelatine: Swill it with water, ink with a greasy ink, and transfer to zinc; or transfer an image, and etch the zinc with an acid solution. Either plan requires considerable practice to obtain good results.—D.

Ironmonger's Spare Time.—EVENING.—The best way that I can suggest for an ironmonger's assistant to utilise spare time in evenings, etc., is to study some of the practical branches of the trade. By practical, I mean the working departments. Take, for, instance, electrical work. In the present day an ironmonger who does not go in for electric bell work is behind the times; and yet I venture to say that very few know anything about the practical making or fitting up. This is one thing that I am sure will well repay your time and trouble, if not immediately, in days to come, when you may perhaps be a master, and have men under you; and even if this is not to be your fortune, you will be all the more valued as an assistant. You should fit yourself up a little work-bench, provide yourself with the necessary tools, and take for your instructions the valuable articles written in WORK by Mr. G. E. Bonney. I call them valuable because, being a practical man myself, I can appreciate their thoroughness and correctness; and I venture to say that if you thoroughly go into them, and carry out the details of electric bell making and fitting, you will create in yourself such an interest that you will seek to go farther into the fascinating paths of electricity. If you have any workmen on the firm in which you are employed, they would, no doubt, assist you in any technical details that you might find difficult. If you persevere, you will soon find it remunerative. I have in my mind a young man in exactly a similar position to yourself who studied the subject I have recommended to you, who is making a fair sum doing this kind of work for his employers: sometimes by himself, sometimes assisting the workmen. There is no reason why you should not do the same if you persevere.—R. A.

Periscopic Glasses.—H. G. H. (*Sheffield*).—The combination alluded to will have the qualities claimed for them. The probability, however, of anyone unacquainted with the properties of lenses is that the combination would not work satisfactorily. Non-corrected lenses, such as those alluded to, if combined, would require very long exposures, as of necessity the working aperture is very small. The best method is to use only two lenses, *close together*. The combined foci would be about half that of the shortest focus lens, whatever lenses were used; for instance: a 24 in. combined with a 12 in. would produce a focus of about 6 in. Of course, this is not exact, but sufficiently so for all practical purposes. Suppose another similar lens was added to this pair, the focus would be reduced to about 3 in. As spectacle lenses can be purchased of any focus, varying about two inches, as 20, 22, 24, and so on, for the camera mentioned one of 20 in. focus and one of 14 in., with the 20 in. outside, would form a good combination and give a nice-sized image. If this focal length was not approved, using a lens say 10 or 12 in. instead of the 14 in. would reduce the size of the image without the intervention of any other lens to alter the focus. The fewer the lenses the better the results. Get one of the photographic journals of about a year ago, in which a paper on the subject by Mr. Lyonel Clarke, read before the Camera Club, was published. The experiments made by him and recorded in that paper will supply very much useful information of the kind desired that the space at disposal in these columns is inadequate to give in detail. It must always be remembered that the spectacle lens, being uncorrected, cannot be treated satisfactorily in the same manner as properly cemented and corrected ones. It is an *inexpensive* method of making a *practicable* instrument, and one that will do *really* good work; but at the same time it must not be expected to have all the good qualities of an orthodox first-class lens.—D.

Binding WORK.—F. C. S. (*Manchester*).—The London price for binding the yearly volume in the cloth cover is 2s. 9d., but the carriage to and from London would, of course, be additional.

Switchback Railway.—SIGNARF TSEW.—You do not say how long the railway is to be, nor how many passengers the carriage is to contain—in fact, you give no data at all upon which to work, so I can only give you a few general instructions. The difference in height between any summit and the one next after it should be at least one-hundredth of the length of rails laid between these summits, and if your carriage does not run very easily this difference may be insufficient to carry it over. At each summit you may make the rails in a short circular arc convex upwards, and these arcs are to be joined by circular arcs convex downwards. The depth of descent does not signify so long as the difference of summit heights is determined in proportion to the *length of rail* (not horizontal distance between summits). Your track may be carried on timbers about 4 in. square on braced trestles of the same scantling, placed about 10 ft. apart. On the horizontal timbers—which are to be cross-strutted together—are spiked down railway bars of the lightest section you can get. Vignolle's section is very convenient: it is single-headed, with flat bottom, and held down by hook bolts. There is nothing special about the carriage: it may be made like an ordinary open tramcar, with cross or garden seats. You must be careful that the rails meet accurately at the joints, and that their surfaces form an even and *continuous* curve; otherwise there will be danger of the carriage running off. At the end of the track toothed racks are laid for some distance beside each rail, and into these fall hanging pawls pivoted under the carriage, to prevent its running back after coming to rest. The end of the track should for safety be carried very nearly up to the level of the starting-point, to prevent an over-run.—F. C.

Model Ship.—J. C. (*Bristol*).—Find, by trial, the point in the ship's length at which it balances as nearly as is practicable, and beneath this point fix a vertical bar—flat will be the most convenient—and support it upon an axis close under the ship. To the lower end of the vertical bar, which may be any convenient length, fix a weight, such as a lead disc, just sufficient to hold the ship upright. Get a clock movement—second-hand will do—take out the escapement, and fix a crank, say 1 in. throw, on the arbor of the minute hand. Connect the pin of the crank by a rod, with the vertical bar under the ship, at such a distance below the pin on which it hangs as will give the required pitch. The best way to do this will be to fit a tightly-sliding block upon the vertical rod, and on the block fix a pin to take one end of the connecting-rod from the crank, then this block can be slid up or down until the required movement is obtained. A light spring should be fixed to the case, with a screw behind to press it against the crank arbor, to regulate the speed of the movement. The sea may be represented by glazed green "lining" (sold by drapers), and should be glued round the sides of the ship and round those of the case, being left loose and crinkly, to represent the rise and fall of the waves. Your ship would look better if you made it to roll as well as pitch. To do this you would have to carry the vertical bar (which would then be round) in a ball and socket joint instead of on a pin, and let its lower end rest in a hole in a horizontal wheel, carried, instead of a crank, by the clock movement. The mechanism must be carried by cross-pieces to leave the bottom free, which must be put on last, after the "sea" has been glued in.—F. C.

French and German Accents.—W. A. (*Beckenham*).—If the dictionaries you refer to do not supply what you want, no other books occur to our mind.

Van Wheels.—W. B. (*Kent*).—I am engaged at present in writing on wheel-making. In the meantime, until the subject appears, you must read carefully a former answer of mine to a querist on wheel-making in "Shop," No. 66, Vol. II., page 225. The nave or hub of a van wheel will have to be turned "coach fashion," and not "cart fashion." The illustration in No. 66 for hand-cart wheel is turned cart fashion; it will also be better and cheaper for you to buy the spokes ready dressed and tenoned. Yes, you will have to use a templet or felloe pattern to work by. To ascertain the length of felloes for a wheel, however large or small, we describe a circle ½ in. higher than the height of the wheel. We next describe an inner circle, 2 in. or 2¾ in. (whatever the thickness of the felloes or rim may be) distant from the outer circle. If there are to be sixteen spokes in the wheel, we divide the circle into eight equal divisions or parts, each part representing a felloe. If there are fourteen spokes, we divide into seven parts, etc., two spokes to each felloe. A piece of wood should be fixed so that one of these parts is described upon it when dividing the circle into parts; each part must be of equal length, or the felloe joint would have the wrong bevel: a most important point in wheeling. When the pattern is sawn out, the size of the wheel should be painted upon it, to show at a glance what height the wheel would be if seven or eight of these were placed in a circle. Use an ordinary carpenter's hand saw for jointing, the felloes being sawn out with the band saw.—W.P.

Mole Traps.—E. M. (*Rainham*).—Thanks for your answer, which you will have seen has been anticipated. That "star of the first magnitude" which you allege you saw "on the ground" at midnight might suit some scientific paper rather than WORK. We deal with hard facts.—ED.

Gas, Petroleum, and Wind Motor.—C. T. A. (*London, N.*)—The question whether you can make a petroleum engine is difficult to answer. There are two in the market: Priestman's (Messrs. Priestman Bros., Holderness Foundry, Hull) and Knight's (J. H. Knight, Barfield, Farnham). A quarter horse-power petroleum engine would cost about £30, much the same as a gas engine. If you tried to make one, you would, of course, have to study the patents, so as to avoid infringing them. Another plan would be to use a gas engine, and let it draw its charge through one of Fletcher's gas generators, which is simply a box filled with cotton wicks dropping into petroleum; air drawn through the box comes out an explosive mixture. Write to Thomas Fletcher, gas engineer, Warrington, and ask if he makes gas generators for that purpose. Perhaps the Robinson hot-air engine would suit you. It will require less attention, and be more easy to manage than a petroleum engine, and have no bad smell. Now, as to the wind motor. This might be managed if you live in a windy situation, and if you employ some means to store up power for use when the wind does not blow. Here lies the difficulty. Windmills can be used to pump water, which is stored up till wanted; they are just the things for that, because they can pump a little more whenever the wind blows: but for a lathe or dynamo you must have some way to store up the wind power, since you may be a day or two without any at all; this can be done by electrical accumulators or secondary batteries, or by using the wind power to force air into a receiver for compressed air, which air you would use to drive an engine exactly like a steam engine. You see, the whole thing becomes rather complicated. No. 94, Vol. II., contains an article on "Small Dynamos for Electric Lighting." Consult the advertisements in WORK.—F. A. M.

Steel Spike Hook.—A SUBSCRIBER.—I should try a local gas-fitter or an ornamental smith. They would procure the castings and supply and fit up the other parts.—J.

Wages.—APPRENTICE.—There is no fixed rule for the rate of wages payable to a cabinet-maker's apprentice, as so much depends upon the class of trade done and the amount of premium paid. If you are properly "bound," your best way is to endeavour to make yourself master of your trade; you will then be in a much better position to estimate your proper value and ask accordingly.—E. D.

Perpetual Motion.—H. D. S. (*Uxbridge*).—You are probably right when you premise that your invention for securing perpetual motion may not gain the end you desire. A good many minds for a good many years have been engaged upon the same matter, but hitherto without success. This need not, however, prevent you from submitting your model to us, and most assuredly it shall be kept strictly private.—ED.

Frosty Windows.—SCULPTOR.—When the moisture suspended in the comparatively warm air of your shop comes in contact with the glass, which is of much the same temperature as the freezing air outside, it is of course condensed and frozen into ice. You might generally avoid this and the other inconveniences of which you complain, as well as greatly increase the warmth and comfort of your workroom, by having double windows—two thicknesses of glass. Between these you would have a space filled with temperate air, and thus keep the frost at arm's length, so to speak, from the glass with which the air of your room comes in contact. This is the plan adopted in northern countries. Yet surely, with ordinary windows, you can place a cloth, or something else which will suck up the moisture from the melting frost flowers, at the bottom of the glass to prevent it from running down your walls.—M. M.

Cleaning Monuments in Stone and Marble.—SCULPTOR.—We are not aware that there is any way of removing lichen, etc., from soft stone without labour. Acids would rot the surface, and potash should be used with caution. But for preventing such growths we imagine that a solution of silica (the "water-gloss" of the mural painters) might well be employed. It would harden and protect the surface without in any way clogging or disfiguring it. We are under the impression that it has been successfully used, but have not ourselves tried it; but we are well acquainted with stones which develop a natural coat of silica by exposure and preserve their sharpness and cleanness in consequence. As regards removing stains from Sicilian marble, information on the subject will be found in Vol. II., on pp. 406, 437, 458, (Nos. 77, 78, 80), and elsewhere in WORK. If potash, salt of lemons, or soaking in wet sand fail to remove such discolorations, we cannot say what will fetch them out. Some stains are so obdurate that no ordinary remedy seems to touch them, and any reader who has had special experience in this direction would do good service by enlightening his fellow-workers.—M. M.

Brazing.—L. W. (*Islington*).—For information on brazing, see Nos. 36, 42, 48, 50, 65, 76, and 92 of WORK.

Re-setting Glazier's Diamond.—SPARK.—A similar query to yours is answered on p. 224, No. 67, Vol. II. of WORK. From the particulars there given, you will be able to judge if you can do it yourself. The best plan in most cases is to send it to some such firm as Sharratt & Newth, 44, Percival Street, Clerkenwell, London, E.C., or any other maker of glazier's diamonds.—H. S. G.

Scotch Bagpipe.—LOVER OF MUSIC.—The Scotch bagpipe is composed of a sheepskin bag, covered with baize, tartan, or some similar material, which forms the wind chamber. The skin is kept soft and flexible by a piece of fat which is always kept inside. The chanter tube is bored with seven finger-holes in front and one behind for the thumb of the left hand, and this tube and the three drones are tied into the wind-bag in such a way that no air can escape. Then there is the mouthpiece tube. All these tubes are, of course, wood, and are mounted in silver or ivory, according to price. We should, however, advise our correspondent not to attempt the making of a set of bagpipes throughout, and we therefore give him the name of a firm of pipe-makers, who will perhaps supply him with the detached parts of proper proportion. The sounds which can be obtained from a properly made pair of bagpipes are so fearful and wonderful that one shudders at the idea of the awful possibilities of an amateur production. The name of the firm is John Center, Morrison Street, Edinburgh.—G.

Rain-Water Pipe.—J. G. (*Glasgow*).—A correspondent, J. G., asked some time since for information how to get the shape of a pipe coming down over a plinth. The Editor himself, in the absence of clear information on the part of the querist, supposed a plain zinc pipe was intended, and gave information as to the projection of the sheets. J. G. now explained that a cast-iron pipe was meant, and the Editor, knowing this was in my line, passed the question on to me. I took a pipe of the form I thought was wanted, set it out in one plane, and showed on p. 381, Vol. III., how the bevels could

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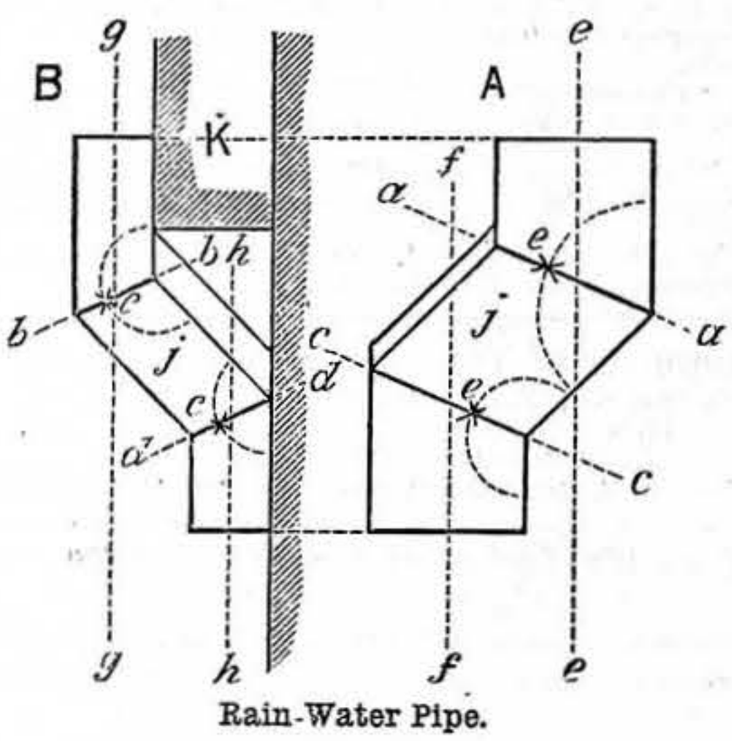
be obtained. J. G. sends at length a model of a pipe set out in *two* planes, of which the accompanying figure is a drawing, made to scale, and asks how to get at the bevels for the joints of the pattern. I sent back a reply, printed on p. 573. Now comes an impertinent letter from J. G., saying:—"Sir,—This, the commonest and simplest of jobs, has evidently baffled J. to demonstrate what was wanted. He (J.) says, 'Draw out the pipe in elevation and in front view, bisecting the angles.' Great Euclid! what does it mean? We strongly suspect the *studium inane* of Darwin. We earnestly hope you will not allow this to slip without a demonstration." As a final reply, I insert this sketch in WORK for the verdict of my pattern-making friends. J. G. has sent a model of a pipe of which he has actually got the bevel, and then asks how he is to get it! Although so ludicrously simple, I must needs go now into trivial details. Thus, at A there is a front elevation, at B a side elevation of the pipe in question. It is therefore set out in two planes—that is, in both front and side views. J. G. wants to get the angles of *a a*, *b b*, *c c*, and *d d*. I said, and say still, set out the pipe on a drawing-board, and bisect the angles formed by the pipe body, and cut the pattern accordingly. Thus, the centres, *e e*, *f f*, are the



Rain-Water Pipe.

centres of the pipe in front view; *g g*, *h h* are the centres in side view. Set these out to full size or to scale, and the outline of the pipe also. Draw in the sloping part, *j*, in any convenient diagonal position to clear the plinth, K. Then bisect the angles formed by the pipe outlines, as at *e*, *e*, *e*, *e*, and draw lines *a a*, *b b*, etc. The lines *a a*, *b b* will give one joint face, the lines *c c*, *d d* will give the other, which, if worked to with saw and plane, will ensure the pipe being of the shape required to clear the plinth. Without commenting on the insolence of J.G., to whom I shall not reply again, I ask the readers of WORK if they know of any more ready and practical way of getting at the angles in the Fig. The query was sent to me because I am familiar with pattern and foundry work. I have made, and have given instructions for making, hundreds of jobbing pipes of all kinds, and I have described just the way in which I should set about it, with the certainty of making a correct job. Even the gods must fight in vain against stupidity; and if J. G. is unable to understand this description, I cannot make it clearer; or, if he wants some more elaborate and roundabout way of doing the simplest possible job, then I ask, *cui bono?*—J.

Writing-Desk.—G. J. W. (*Ballymena*).—It is a pleasure to reply to such an explicitly placed query

Fig. 2.

Fig. 3.

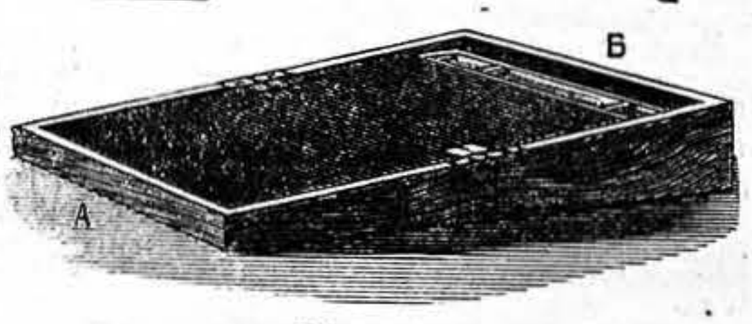


Fig. 1.

Writing-Desk. Fig. 1.—Desk open. Fig. 2.—End View of Desk when closed (drawn to a smaller scale). Fig. 3.—Section of Screwed Piece against Ink-Pot Spaces to form a Rebate for Lid.

as yours. One comprehends instantly the correct requirements. The desk, of which a sketch is here subjoined, is undoubtedly the one you are in search of. The back and front sides, respectively A and B in Fig 1, contact with each other when the desk is closed, as in Fig. 2. It is essential that the *hinged* sides each coincide exactly in depth, to permit of proper adjustment. According to an old article of the kind I have in my possession, the depth of A should be about 1 in., that of B 3 in., while the intervening divided sides (Fig. 1) should each be about 2 in., thus making a uniform depth, when the desk is closed, of 4 in. Your proposed length of 20 in. (when open of course) is suitable. A proportionate width will be 12 in. Two thin lids are bound to each other by means of the fabric covering them, a width of fabric intervening between the united edges equal to two thicknesses (about three-eighths) of the sides. The latter are rebated, where necessary, to allow the lids to lie flush, while they are held permanently in position by means of the fabric being tacked to the hinged sides of the desk. In lieu of a rebate adjacent to the shallow ink spaces, a small strip (C, Fig. 3) could be screwed. Space forbids more remarks, excepting to say that the hinges are screwed to the narrow side edges.—J. S.

III.—QUESTIONS SUBMITTED TO READERS.

*** *The attention and co-operation of readers of* WORK *are invited for this section of "Shop."*

Ornamental Brass Castings.—J. P. (*Accrington*) writes:—"Will any reader of WORK give me the address of a firm where ornamental brass castings, such as horses, dogs, clowns, etc., may be had?"

Carboline or Carbolinum.—WICKER would be glad to be informed where this is obtainable in London.

Lucrative Home Industry.—W. M. Q. (*Elgin*) asks if any reader of WORK would kindly inform him of a lucrative home industry. He lives in the country, and could spare a few hours each evening.

Colours for Diagram.—A NEW READER writes:—"I have to make some diagrams, coloured. I have tried water-colours, but they are not brilliant, and crayons are liable to smudge. Is there any preparation to cover the crayon with to keep it from smudging, or any other colours I could use more suitable?"

Vellum.—F. B. (*Clapham, S.W.*) writes:—"Would anyone kindly mention the name of some firm on the Continent where I could purchase vellum in large quantities, or tell me the best plan to adopt? I am given to understand that I should have to pay double the amount for an inferior article over here."

Vertical Furnace.—G. W. (*Bournemouth*) writes:—"I should like some particulars of a vertical furnace (with a sketch, if possible) for heating wheel tires. Some reader, perhaps, may be able to oblige. Should the chimney or shaft be the door end, or *vice versâ?*"

Quick Varnish.—J. K. (*Patricroft*) writes:—"Would any reader kindly give through the 'Shop' column a recipe for varnish that will dry quick and bear out with one coat at a small cost? The above is for skipping-rope handles, spinning-tops, and wooden toys—something after the style of a Venetian blind gloss."

Adhering Composition.—F.W. (*South Darenth*) writes:—"Could any brother reader of WORK inform me of a composition that will make paper adhere to steel bands which revolve upon two wheels, about two inches in diameter?"

A Hard and Fast Cement.—A. R. (*Redcar*) writes:—"I have tried the recipe for the above, given in 'Means, Modes, and Methods' part of WORK on p. 602, and find it is a complete failure. I shall be pleased for some further particulars."

Water-Wheel for Saw Driving.—CELL writes:—"I should like to know, through 'Shop,' the way to make a water-wheel to work a circular saw 6 in. in diameter."

Cameo Cutting.—J. A. B. (*Camberwell*) writes to say that "he takes in *Cassell's Family Magazine*, and that he has read a chapter on the art stated above, wherein the writer mentions that the designs are cut out of conch-shell, and also that pieces of the shell are sold besides whole ones; also that special tools are made for carving the designs. Could some of our readers of WORK mention some of the principal firms that supply the material and the tools that are used in carrying out this art?"

Maguay Electric Lamp.—W. M. (*Dundee*) (see WORK, No. 142) writes:—"Would W. G. Sherborne let me know where these can be obtained, and probable cost of same?"

Magnetism.—BEGINNER writes:—"I want to magnetise several bars of steel, 5½ in. long, for experimental purposes. Will some reader tell me the best way to do them? I am anxious to make the necessary apparatus."

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Wool-Winders.—A. M. (*Glasgow*) writes, in reply to MART (see p. 621, No. 143):—"In response to the request of a correspondent for a design and some details of construction of a wool-winder, I enclose two designs of this article which I have seen in use. The first (illustrated in Figs 1, 2, 3, 4, and 5) consists of four lattice-work arms fixed to a central stand, the whole revolving while the wool is being wound. In Fig. 1 is given a general view of the article in use, the ball being for a moment placed in the cup. Fig. 2 shows a section through the centre of the article, and as it is drawn half full size, all the various sizes, etc., can be easily obtained. The lowermost portion is for fixing the apparatus to the edge of a table. It is in the form of a cramp, the screw underneath working fast against the under side of the table top. In this portion all the rest of the apparatus revolves. Notice the centre pillar entering into this part in Fig. 2; it must not be made at all tight, as it must revolve freely. This pillar carries the four expanding arms, which are connected with it by means of a pair of collars or rings, and above all is the cup for receiving the ball of wool at any time the individual winding may want both hands free. A smaller sketch of the lattice-work arm is given in Fig. 3; every alternate bar is, for the sake of strength, made double, the single bar being placed between the two portions of the double bar, and riveted as in sketch (Fig. 4). The four arms are connected by means of a pair of collars, as shown in Figs. 2 and 5, the latter Fig. being a top view of the collar. The arms are inserted in the slots prepared for them, and are fastened with a pin. The lower collar is fixed to the pillar, but the upper one is left free to slide up

Fig. 5.

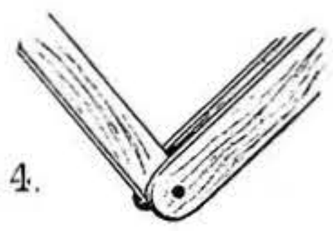


Fig. 4.

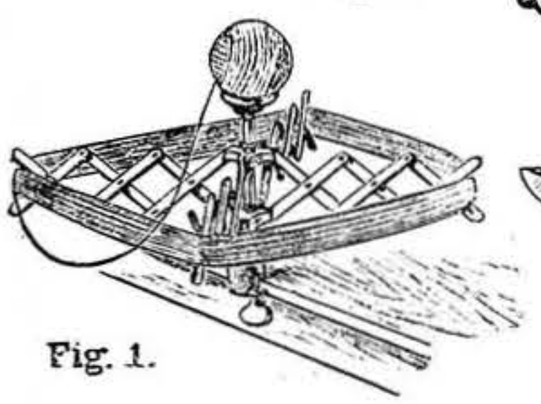


Fig. 1.

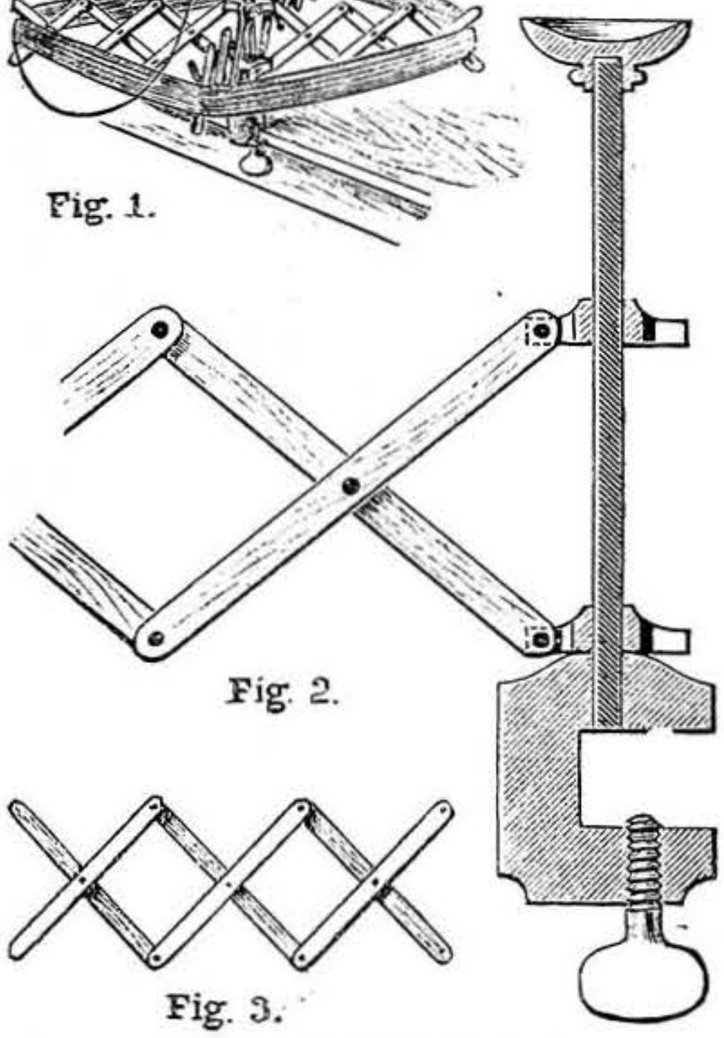


Fig. 2.

Fig. 3.

Wool-Winder and Parts.

and down the pillar, as the arms are contracted or expanded, to suit the wool. To keep the arms fixed at any particular size, a screw pin is inserted in one side of the top collar to screw against the pillar (see Fig. 5). As lightness is an essential in the construction of the revolving portion of this article, the wood should be kept thin, and therefore should be made of birch or such tough stuff. The other design, of which a general view is given in Fig. 6, consists of a pair of large reels fixed to the edge of

Fig. 8.

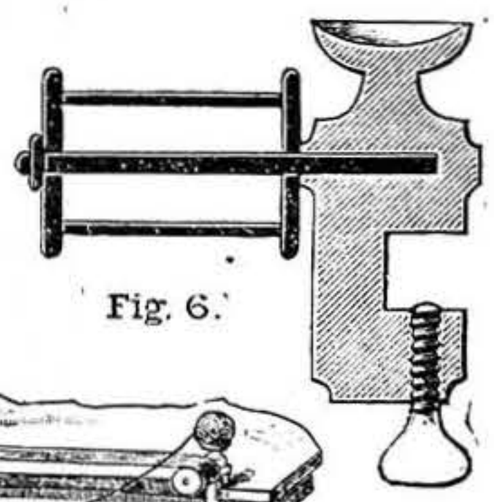


Fig. 6.

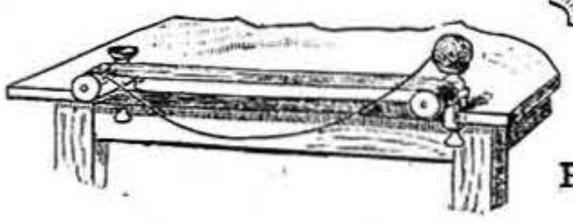


Fig. 7.

Wool-Winder and Parts.

a table, at a suitable distance apart. The wool is put over the two reels, and wound from them. An enlarged drawing of these and of their necessary fastenings to the table-edge is given in Fig. 7, drawn half full size. The recess for the table top and the screw for pinching it and keeping all tight are there shown, while further up is seen the cup in which the ball may be at any time placed. The spindle on which the reel revolves is inserted on one side and made fast, and the reel itself is shown in end view in Fig. 8. It has four bars or rods across from end to end. This design is undoubtedly a stronger one than the former, though it does not

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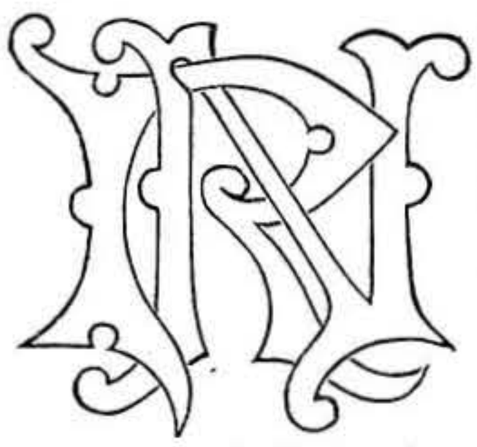
seem so compact. Each has its own advantages, and both perform their duties in a satisfactory manner, and that is in itself no mean recommendation."

Saw Bench.—CHOPSTICK writes, in reply to WOOD-WORKER (see p. 622, No. 143):—"I beg to inform him and others that before these lines appear in print an article on a saw bench to work by hand will be in the Editor's hands, and he will most likely publish it at his convenience. It will be a practical tool, and will cut timber up to three inches thick, as I have done myself on a similar home-made bench."

Monogram for Fretwork.—R. D. T. (*Marylebone, W.*) writes (see p. 590, No. 141):—"I notice in 'Shop' that N. R. (*Yeovil*) asks for a monogram for fretwork. I have made a sketch of one which I think would perhaps do, and hope N. R. will like it."



Monogram for Fretwork.

Photography.—D. C. (*Marsden*) writes, in reply to C. E. H. (*Horwich*):—"I may say I know a little about the process of colouring photos by the transparleum method, that being the word our correspondent had forgotten. The address from which I obtained my outfit of material necessary to make transparleum pictures was the Continental Novelty Company, but I cannot vouch for the existence of the company now. About two years ago I wrote to the address, asking them to forward me more materials. About a week after I received my letter back from the Dead Letter Office, saying that they could not find the company with the address given; so that they must either have changed address or else have given up the business. For my part, I cannot see the slightest difference between the crystoleum and the transparleum method of painting or colouring photos. I have read the articles which have appeared in Vol. I. of WORK on the crystoleum method of colouring photos, and I think it is exactly like the transparleum process in every detail."

Besoms.—TRIPLE EXPANSION writes, in sequence to BESOM MAKER and J. W. H. (see WORK, p. 635, No. 144):—"Worcestershire is well stocked with gipsies, and I will try to find one that makes besoms. Besom-making is a trade carried on in Bewdley, three miles from here (Kidderminster), and Richard Ashcroft, of Bark Hill, Bewdley, is a good maker."

Skates.—L. L. H. (*Falmouth*) writes, in reply to JACK FROST (see p. 637, No. 144):—"I strongly advise you not to attempt to grind your own skates: you would almost surely spoil them. They should be ground across the stone, and it is a job that requires much practice."

Photography versus Painting.—H. E. (*S. Norwood*) writes, in reply to A. B. (*Glasgow*) (see p. 686, No. 147):—"Without seeing your painting it is impossible to say why you cannot obtain a copy. Have you tried isochromatic plates? These are the only ones to render colours correctly. Possibly your painting may be yellow with age. If so, ordinary plates would not be of much use. As you say several experienced men have had a try, I do not know what to advise. Perhaps the Mahatmas are having a game with it. If you think it worth your while to send the picture on to me, I will see what I can do. I have had some little experience in copying."

Early Riser's Friend.—H. E. (*S. Norwood*) writes, in reply to WILL (see p. 686, No. 147):—"If you write to Stevens & Son, of Whitecross Place, Wilson Street, E.C., sending them a copy of the article in question, they will make you all the fittings at a reasonable rate. Their workmanship is A1, and price moderate."

Fret Saw.—J. W. B. (*Huddersfield*) writes, in answer to W. M. (*Brixton Hill*) (see p. 654, No. 145), "that Barnes' improved fret saws are used by fret-cutters and carvers, and equal steam-power."

Pins.—M. (*Bishop Auckland*) writes, in reply to A. W. B. (*Bristol*) (see p. 622, No. 143):—"Send 6d. to Kirby Beard & Co., Bradford Street, Birmingham, for their sample card and description of pin-making, which will give you all particulars."

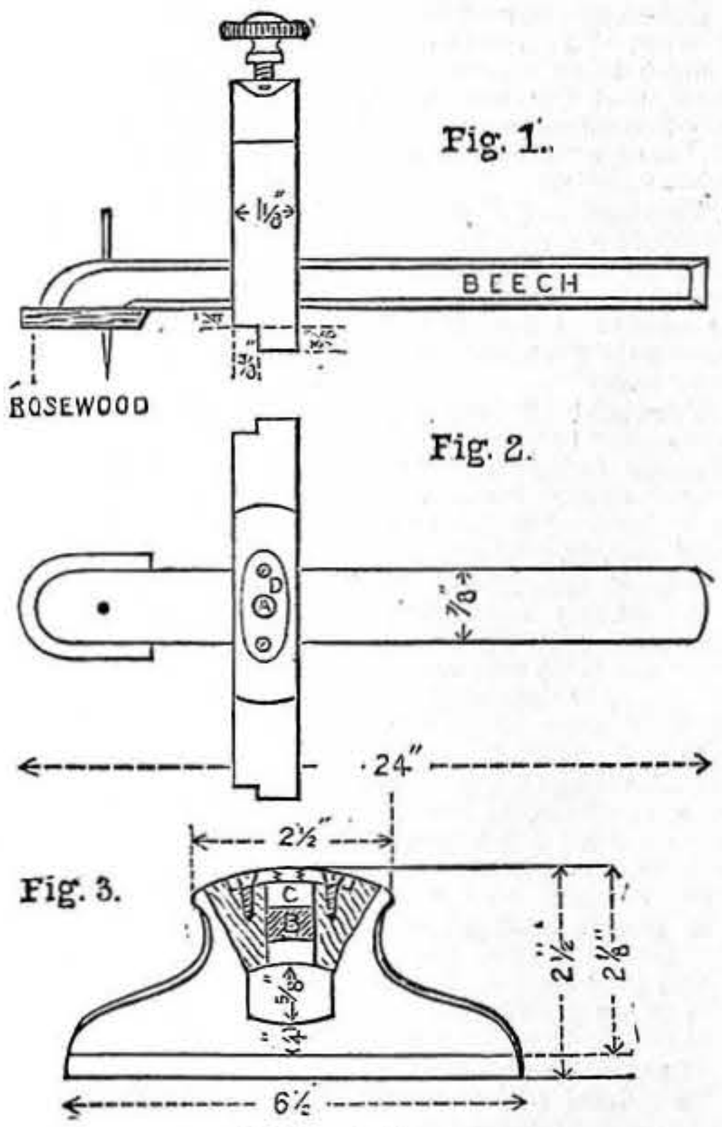
Pottery and Porcelain.—M. (*Bishop Auckland*) writes, in reply to T. H. L. (*Dublin*) (see p. 606, No. 142):—"One of the following will suit you: Chaffers' 'Collectors' Handbook of Marks and Monograms,' price 5s.; or Chaffers' 'Marks and Monograms,' price 32s. (Batsford, of High Holborn)."

Water Motor.—M. (*Bishop Auckland*) writes, in reply to WATER MOTOR (see p. 606, No. 142):—"The Editor has a drawing and description of a water motor, which will be published as soon as space can be found, which I think will suit you. All particulars are given with it. Should any part not be sufficiently clear to you, if you write again I will give you any further particulars."

Model Yacht Fittings.—M. (*Bishop Auckland*) writes, in reply to T. H. L. (*Newport, Mon.*) (see p. 622, No. 142):—"You can get fittings for model yachts from Mr. Lee, who advertises in WORK; or if you want to make them, if you say what you require I will send you a sketch. I have made my own fittings for a cutter 3 ft. long."

Fretwork.—N. T. LEE (17, *Home Road, Battersea, London, S.W.*) writes to W. M. (*Brixton Hill*) (see p. 654, No. 145):—"If W.M. will take the trouble of calling at above address (not very far from his home), I will show him a machine (a Dexter) which I have had in constant use for the past seven years, and which looks like lasting for the next seven years. I will also show him work done by it up to one inch thick, and down to 'cigar boxes.' I have seen many machines such as he describes 'useless.' Let him write me the time he intends calling, so that I can be 'at home,' as I may be able to give him a few other 'useful hints,' which I will willingly do. I am the winner of the first prize in Group I., Division A, Class 3, and also special prize for best exhibit taken from WORK in 'Work Exhibition.' The Dexter machine is sold in two sizes, I think, A and B, by Messrs. Churchill, Finsbury Square. I will have great pleasure in showing the machine to any reader of our valuable WORK who may give me a call."

A Panel Gauge.—EDDIFRA writes, in answer to APPRENTICE (see p. 606, No. 142):—"A panel gauge made to the following dimensions makes a very handy gauge for gauging up to 18 inches. It looks well made of beech, with rosewood tip; it is fixed



A Panel Gauge.

by means of a thumbscrew or milled screw, which presses a piece of boxwood, ⅜ in. square, on the shaft. In the sketch, D is a small iron plate, A is a ¼ in. tapped hole for milled-headed screw, B is the piece of boxwood, and C is the square hole in which it works."

Dexter Fret Machine.—M. (*Bishop Auckland*) writes, in reply to E. W. (*Cupar, Fife*) (see p. 686, No. 147):—"The makers of this machine are J. H. Skinner & Co., who advertise in WORK."

Fretwork.—M. (*Bishop Auckland*) writes, in reply to W. M. (*Brixton Hill*) (see p. 654, No. 145):—"If you procure the catalogues of J. H. Skinner and Co., Harger Bros., or the Britannia Co., all of whom advertise in WORK, you will find drawings of some very good treadle machines. The advantage of these is that they leave both hands at liberty; although some fretworkers prefer the hand-saw."

V.—LETTERS RECEIVED.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—W. H. C. (*Homerton*); SIGNALMAN; KODAK; W. L. K. (*Rochdale*); CHUCK; H. W. (*No Address*); G. E. H. (*Worcester*); TASMON; TINSMITH; YANKEE; H. H. (*Worcester*); VOLTIC; W. R. R. (*Carlisle*); CYMRO; E. E. W. (*Abergavenny*); H. H. (*Latchford*); H. H. (*Birkdale*); READER (*Knutton*); THEODOLITE; F. G. (*Gravesend*); J. W. S. (*Guernsey*); F. H. (*Battersea*); R. S. (*Stoke-on Trent*); VIGILANTIA; W. G. A. L. (*London, W.C.*); W. H. A. (*Tamworth*); W. H. J. (*Brentwood*); MAGNET; J. E. L. (*Redcar*); J. D. D. (*Carnarvon*); W. M. (*Market Drayton*); G. A. (*Stoke-on-Trent*); B. P. (*Battle*); A NEW READER; A. T. S. (*Redford*); W. L. F. (*Dublin*); W. H. (*Chorley*); A. B. (*Oban*); W. S. W. (*Keighley*); W. W. (*Wavertree*); F. B. (*Rochdale*); PORTSMOUTH; J. H. (*Mile End*); D. C. (*Luton*); C. H. (*Clerkenwell*); RESILIENT; IGNORAMUS 2ND; TELEGRAPHIST; ELECTRO-PLATE; J. T. B. (*Biggleswade*); R. D. (*Fence Houses*); G. S. (*Fulham*); H. J.; J. B. (*New Cross*); J. K. (*Bishop Auckland*); C. E. (*Liverpool*); F. J. (*Swindon*); R. R. S. (*London, N.W.*); S. B. (*Nottingham*); STUDENT; E. H. B. (*Old Trafford*); PLASTER PARIS; C. W. T. (*Leytonstone*); G. H. B. (*Norwich*); LOVER OF "WORK"; APPRENTICE; H. B. (*Greenock*); SHAMROCK; ILFORD; W. F. L. (*Bootle*); W. L. (*Stoke-on-Trent*); C. B. (*Keighley*); CAWD HUD.

ART WORK EXHIBITION.

THE Secretary writes:—"This will be held in connection with the Building Exhibition, 1892, to take place at the Royal Agricultural Hall, London, N., March 14th, 15th, 16th, 17th, 18th, 19th, 21st, 22nd, 23rd, 24th, 25th, and 26th.

"There will be eight Groups—viz: (1) Carpentry; (2) Carving; (3) Furniture; (4) Painting and Decorating; (5) Metal Work: (6) Building Appliances and Materials; (7) Building Facilitators; (8) Invention and Design.

"These Groups will consist of three Classes in each Group—viz: (1) Workmen; (2) Apprentices; (3) Amateurs; to be judged from their respective standpoints.

"Applications must be received by February 14th, at latest.

"The Best Exhibit in the Art Work Branch of the Exhibition will have a Gold Medal awarded. The Best Exhibit in each Group will be awarded a Silver Medal; and the Best Exhibit in each Class of each Group will obtain a Bronze Medal, all to be accompanied by First, Second, or Third Class Certificates respectively.

"The Second Best Exhibit in the whole of the Art Work Branch will receive a Silver Medal, One Guinea, and First Class Certificate; the Third Best securing a Bronze Medal and Second Class Certificate.

"The Second Best Exhibit in each of the eight Groups will receive a Bronze Medal and Second Class Certificate.

"The Second Best Exhibit in each Class of each Group will be rewarded with a Third Class Certificate."

The Secretary and Manager is Mr. John Black, 2, Newcastle Street, Strand, W.C.

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Picture Moulds.—15 to 25 per cent. saved. Send for wholesale list, one stamp.—DENT's, Importers, Tamworth. [3 R

Water Motors, from 5s.; ½ h.-p., 20s.; list, one stamp.—WALTON, 9, Queen Anne St., Stoke-on-Trent. [2 S

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